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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK GREAT BRITAIN No. 410475 REG. U.S. PAT. OFF.

EE PAGE 896

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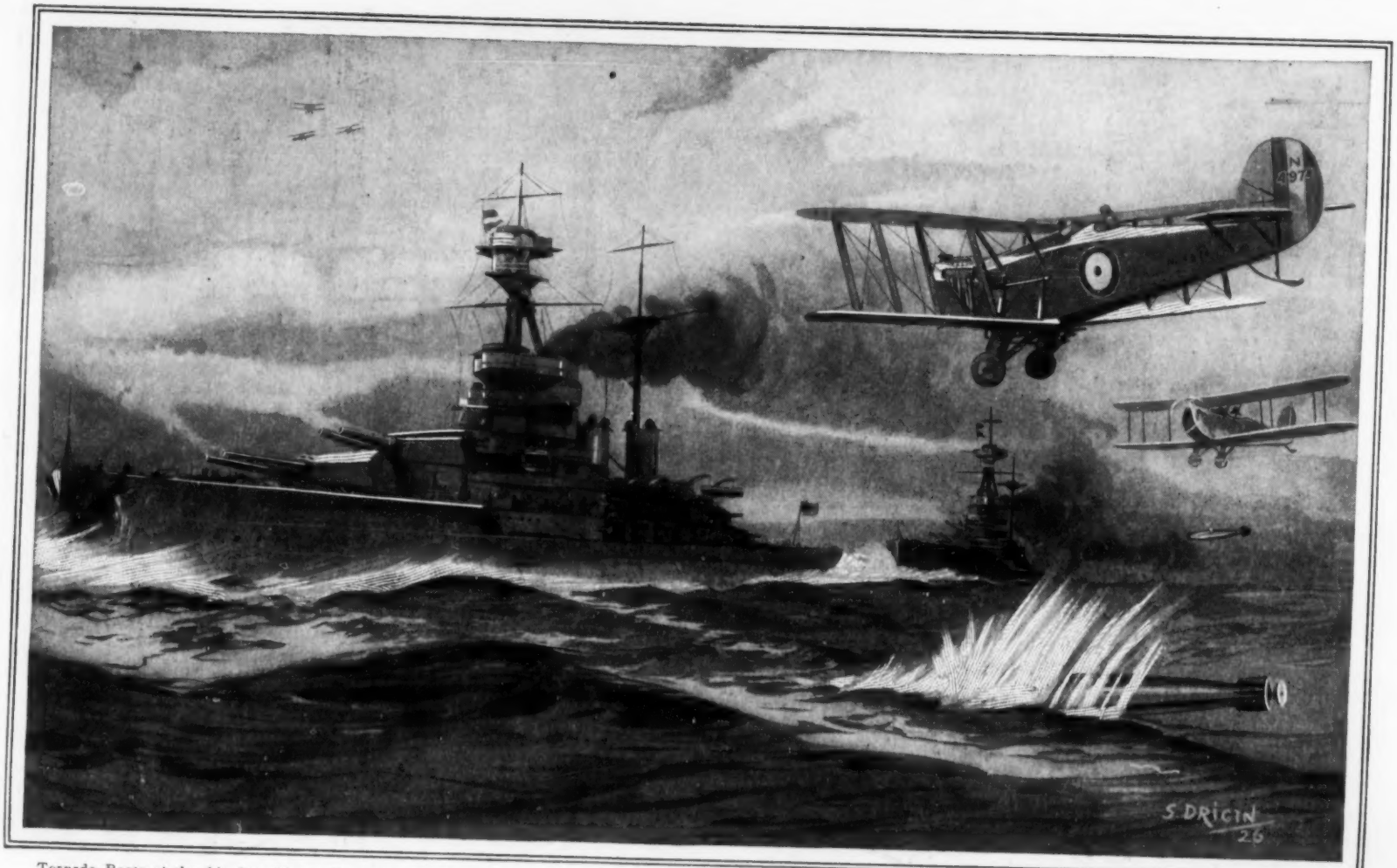

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Torpedo Boats of the Air Attacking a Dreadnaught of the Sea; an Unusual Drawing from a Scene during the Recent War Games of the British Grand Fleet; the First Successful Torpedo Planes Were Built by the U. S. Navy during the War

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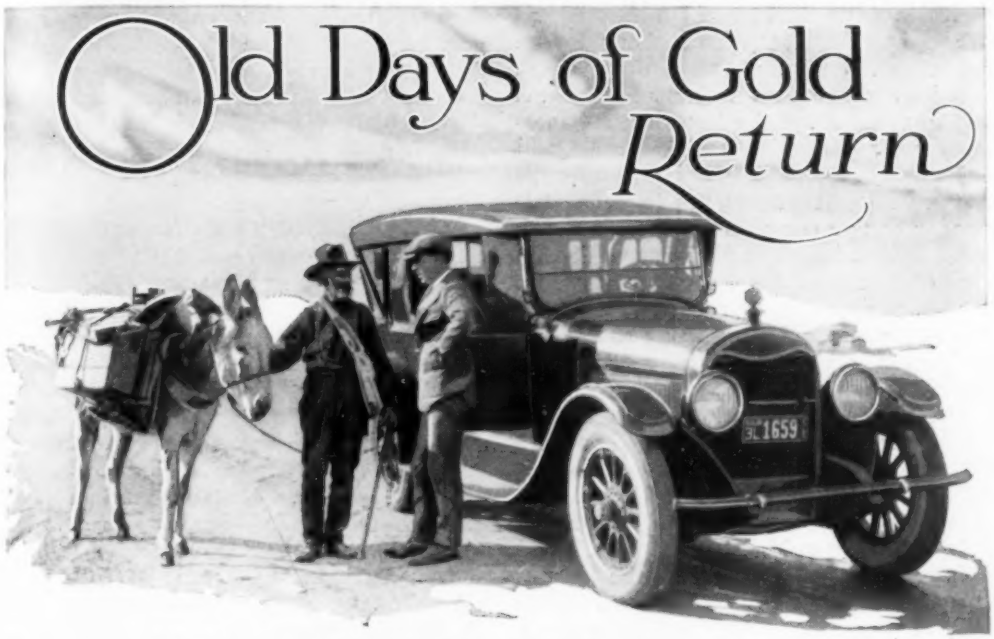
Old Days of Gold Return



Burros and Flivvers Compete Rushing Prospectors to the Maddest Wide-Open Mining Camp Seen in a Generation

TWO nineteen-year-old Nevada boys started out one morning a few months ago to look for gold, found it at noon and flivvered home across the desert in the cool of the evening with samples that assayed $78,000 to the ton.

That started the wildest gold stampede in a generation, founded a tidy little city overnight, and even brought about a bitter fight in the state legislature over a proposal to revoke the anti-gambling laws and establish Weepah, the new gold town, as a roaring mining camp that would equal anything seen in a "Days of Forty-Nine" show.

The two boys who made the discovery, Frank Horton, Jr., and Leonard Traynor, were working an old claim owned by the father of Horton, and made their strike within a few yards of an abandoned prospect shaft, where the father had dug in vain for gold. They had stopped work for lunch, but, while one prepared it, the other picked over the ground, following a badger hole. Suddenly he gave a shout that brought his partner on the run, and both boys scooped up handfuls of rich quartz, shot through with streaks of gold.

Back at Tonopah, twenty-seven miles away, they showed their finds to old and seasoned prospectors, who declared the supposed gold was only iron sulphide, the "fool's gold" of the prospector, and was worthless. Crestfallen, the boys passed out many of their samples to friends, one of whom was interested enough to have the rock assayed, with the result that it was found to run nearly $80,000 to the ton. By the time he reached the boys with the good news, the latter figured they had given away more than $4,000.

Fortunately they had not disclosed the

location of their claim, and they kept the information a secret until the elder Horton returned home to protect their interests. Later the two leased their ground to a syndicate which took $30,000,000 in dividends out of the Goldfield mines twenty years ago.

When the rush to Weepah started, a typical tented mining town sprang up overnight. Its streets, to which the sage brush still clung, were thronged with bearded desert prospectors, many of whom had not met since the last rush a generation ago, and with tourists and gold seekers from nearly every state in the union. Patient burros, loaded with the meager equipment of the seasoned desert "rat," brushed against flivvers that ferried their owners back and forth each day from the hotels of Tonopah, and costly touring cars that came, loaded with all the patent equipment an inspired sporting-goods salesman could sell.

The center of attraction was a trench, ten feet long and four feet deep, on the discovery claim. Beside it, for days, always under guard, rested thirteen sacks of ore, declared to contain between $50,000 and $100,000 in gold.

Tonopah, coming out of the sleepy days that followed its decline, shared the glory of Weepah as a roaring mining camp again. Because of lack of accommodations and supplies at the discovery claim, most of the prospectors and visitors lived in the older city. Gambling houses flourished again, while the legislature debated lifting the ban against them, and dozens of mining companies were born overnight in hotel rooms and even in the streets, where miners met.

At Weepah, out on the barren desert, everything, even down to water, had to be imported for sale in the canvas-and-board-shack stores. One thriving emporium posted a sign advertising water at $2 a barrel, gasoline fifty cents a gallon, ham and eggs for eighty cents and "white mule, fifty cents a drink, chaser free."

Gold strikes seem to run in bunches, for hardly had the news of the Horton-Traynor find been flashed to the world than discoveries were broadcast from Dripping Springs, Ariz.; Angels, Calaveras county, Calif., in the district made famous by Mark Twain and Bret Harte, and from the Silver Peak mountains of Nevada. The last find was made by Frank Horton's older brother Fred and a Chicago youth, while they were touring across country in a battered small car.

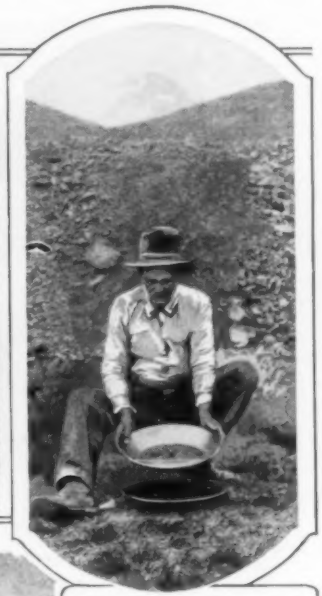
Across the Continental Divide from Weepah, at Delnorte, Colo., another gold discovery is waiting for spring to remove the deep snow so that work can be resumed. There, a pair of Denver men, who leased the old Little Annie mine, first opened back in 1871, made a strike that turned out as much as $16,032 from a 259-pound sack of ore.

Another old mine is being worked again after being abandoned for years with the reopening of the Loraine shaft, 22 miles west of Blythe, Calif. The new vein has yielded ore which has assayed as high as $1,400 to the ton.

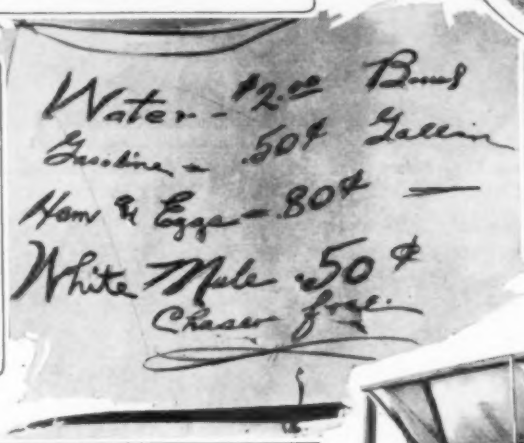
Burros, Known in the West, Because of Their Braying Sing Song, as "Rocky Mountain Canaries," Are Still the Mainstay of the Veteran Desert Travelers and Prospectors

WHERE THE OLD AND NEW MET AT GOLD STRIKE

Frank Horton, Sr., Next to His Son, and Frank Traynor, His Companion in the Discovery



Desert Miner Panning Out the Gold and Carefully Saving the Precious Water to Be Used Again; a Rocking Motion Carries the Lighter Stones and Earth Away and Leaves the Nuggets Behind in the Pan

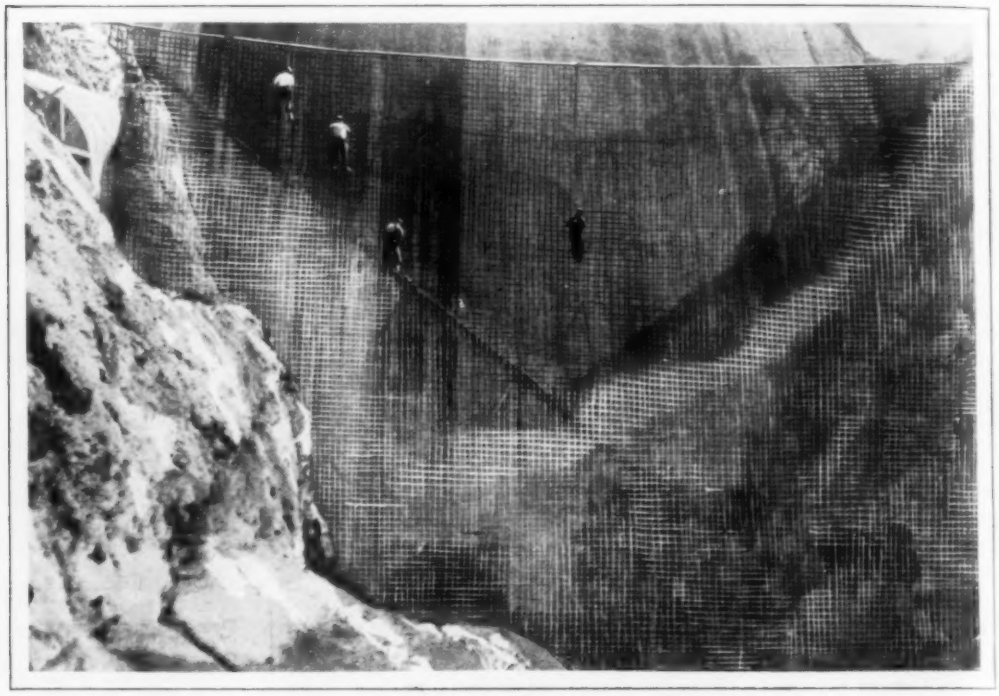


Boom-Day Prices Are Charged for Everything in the New Camp, For All Supplies Have to Be Freighted in from Tonopah; the Sign Indicates That Weepah Is Being Run as a Wide-Open Camp

Too Late to Stake a Claim, the Shoe Repairer Opens Shop in His Flivver

The First Building in Weepah, a Thriving General Store, Is Offered for Sale

GIANT NET PROTECTS THE PENSTOCKS OF DAM



Rigging the Steel Net to Catch Logs Before They Can Strike and Damage Penstocks of Dam near Tacoma, Wash.; Meshes Are Six Inches Square

In order to protect the penstocks at the Lake Cushman dam, recently completed near Tacoma, Wash., from waterlogged timbers, carried along beneath the surface of the water, an enormous steel net has been stretched across a short distance from the upstream face of the dam. It is woven of wire and steel cable, the meshes being six inches square. A strong cable, securely anchored on either side of the canyon, supports it.

WEIGHT OF HAIR TELLS RACE EXPERIMENTS SHOW

Scientists now can determine your race by weighing your hair, tests at the University of Chicago have shown. Using ten strands, each of the same length, the investigators found that the hair of Mongolians is heaviest, that of the Caucasians next and the Negroes' is lightest, partly because of the large number of air bubbles it contains. Research also disclosed that a white woman's hair attains an average length of twenty-five to thirty inches and that four years are required to achieve this growth, as against twelve to sixteen inches for a white man's hair. This difference is not found among other races. Women's hair, however, is lighter than the males'.

EASILY DRIED SHAVING BRUSH HAS REMOVABLE BRISTLES

Packing a damp shaving brush into the traveling kit is said to be no longer necessary with a brush that has removable bristles. They can be spread widely apart for quick drying, or a new filler may be inserted. This last feature adapts the brush to barbers' usage and to greater cleanliness and comfort. The handle is of metal and the bristles are attached to a ferrule which may quickly be taken out for spreading the brush or changing the filler.

STATIC FADES AS TRAIN SPEEDS RAILROAD RADIO SHOWS

Static decreases and radio-station strength increases with and in proportion to acceleration in the train's speed, experiments with a receiver on board a car of the Northwestern railroad have shown. When traveling toward a station, the signals are stronger than when going in the other direction. Bluffs or other obstructions tend to deflect or aid the signals of stations near by, according to their relative location, but do not appear to influence the reception from distant transmitters. A steel bridge with no superstructure, helped to increase the volume of the reception while one with a superstructure decreased it.

METAL CLARINET WON'T CRACK AND HAS GOOD TONE

Especially adapted for localities subject to sharp changes in temperature and for traveling orchestras that encounter a wide range of weather conditions, a metal clarinet has been introduced in America from France. It is said to have the same tone quality, correct intonation, evenness and carrying power of the wood instrument and the added advantage of being immune to cracking and checking. It is made with two tubes, the soldering and tone-hole drawing operations being on the outside casing. When very cold, it may be quickly warmed up to the proper playing pitch.

All-Metal Clarinet as Substitute for Wood; It Does Not Vary So Much under Changes of Weather

Grip Strap on Top of Umbrella Can Be Slipped over Wrist, to Make Carrying Easy

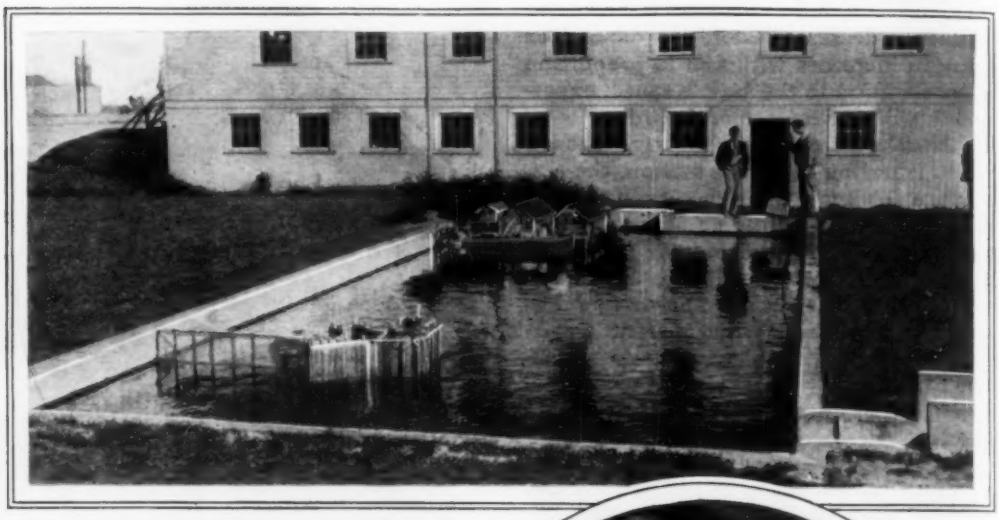
VANISHING STRAP ON UMBRELLA MAKES IT EASY TO CARRY

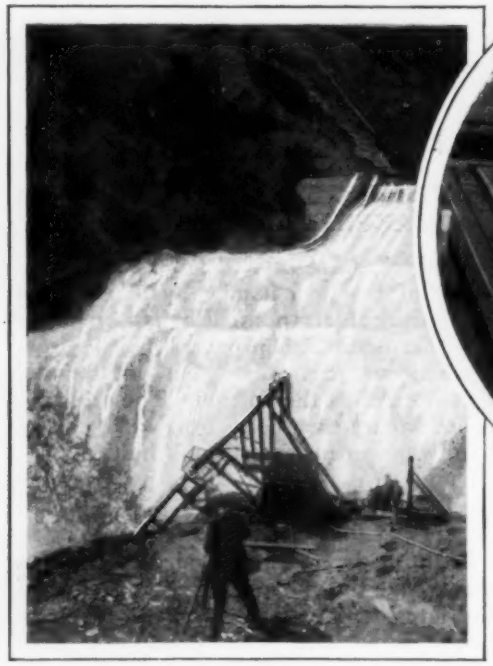
Umbrellas are carried from the top instead of the grip handle by means of a disappearing strap an English inventor has patented. This prevents the ribs from opening up part way when not secured by the catch at the bottom. The umbrella is but twenty-two inches long when closed, and, when open, the strap is hidden.

INSECTS IN THE CLOUDS

Hunting bugs with an airplane, half a mile above the ground and more, is one of the latest methods of scientists who are intent on keeping plant-destroying pests under control. Sticky-paper traps are attached to the planes or to kites, in order to catch any insects that might be flying, and a "patrol" is made over an area where the bugs are believed to be traveling. Flies of two species and an adult corn maggot have been caught at altitudes of 1,000 to 3,000 feet. Some of the insects were believed never to travel at heights of more than a few feet.

RAISING ORNAMENTAL FISH AT UNIQUE COLLEGE





Tank at the Fisheries School with Model Equipment; Close View of the Incubating Vats, and, at the Left, Studying the Fish Elevator

Crossing a moonfish with a swordtail and getting an ornamental species whose like never swam before is only one incident in the work at one of the world's most unusual schools, the college of fisheries at the university of Washington, at Seattle. It teaches not only how to fish and how to make fish ready for market, but also how to raise them; how to make them thrive better, and how to combat diseases. Batteries of hatching jars and glass tanks, chains of miniature hatching pools, rooms full of laboratory equipment, and complicated arrangements of model traps, seines, fishwheels and canning apparatus make up the equipment for instruction. During the winter the students are engaged in classroom and laboratory work, while the spring and summer months send them afield, each working in some branch of the fishing industry. Some go north

to Alaska for the salmon run, where they work in the canneries, at the traps, and on the water. Others cruise on the halibut banks or work the oyster beds and lobster pots on Puget sound, and even go south to the Columbia river for the annual early spring run of smelt. Commercial fish farming, which has reached a point where $400,000 of trout was marketed to hotels and restaurants from fish farms in the state of Washington alone last year, is being stimulated by the distribution of bulletins telling how to prepare and conduct farms. Similarly, the newer industry of raising ornamental fish, which is now beginning to thrive, is being guided with expert advice; and here the college gathers and breeds rare specimens from all parts of the world. The fish frequently are distributed to private breeders as a part of the work of encouraging the development of new and beautiful bizarre forms. Besides conducting research among native species of commercial marine forms, the college is busy transplanting new forms. A huge Japanese oyster, which weighs a pound or more and is almost as large as a beefsteak, has been introduced and is now beginning to thrive, according to reports.

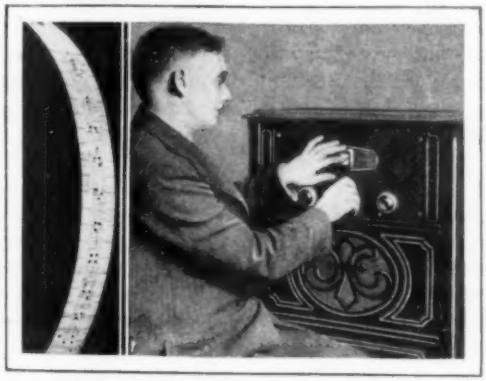
Not a Toy, but a Serviceable Car; the Midget Electric Auto

TINY ELECTRIC ROADSTER RUNS THIRTY MILES ON CHARGE

Weighing but 344 pounds, complete with storage batteries, a midget electric roadster for two persons has been designed for sport and utility as well. It saves using the large car on many occasions, is serviceable in large industrial plants and can be taken on outing trips where the ordinary automobile would not be practical, as at the beach. A speed of ten to twelve miles an hour is obtained from two standard six-volt storage batteries. This rate may be increased several miles by using a special sixteen-volt battery. Under favorable conditions, a single charging of the six-volt batteries will give thirty miles. The car is equipped with a lock brake, is easy to operate and the battery box may be employed as a seat for a third person when desired.

RADIO RECEIVER FOR THE BLIND HAS PINHEADS FOR NUMBERS

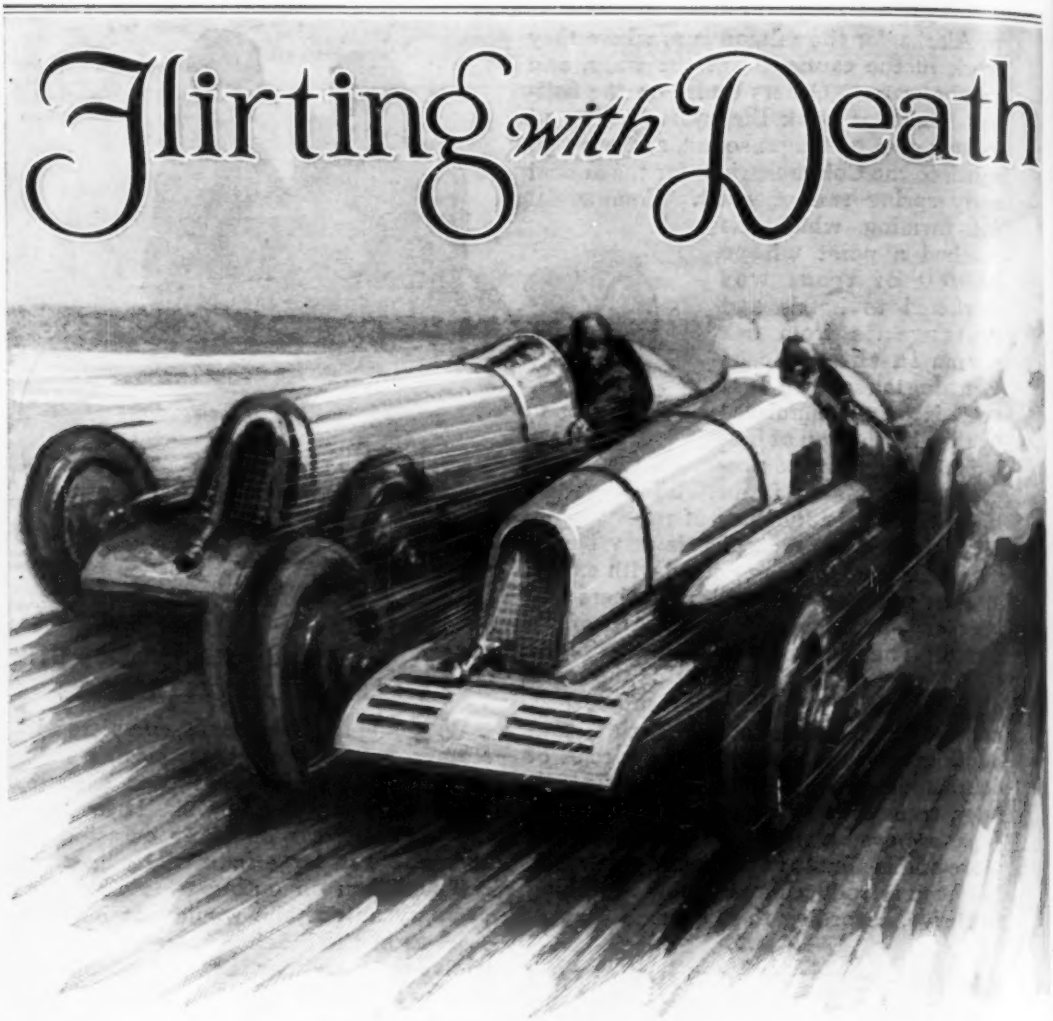
To enable blind persons to tune in different stations on the radio receiver, the dial numbers are converted into raised characters by placing pinheads in the proper arrangement to form the Braille equivalents for the usual symbols. This plan was devised by two blind men who found some difficulty in using the ordinary receiving set with standard equipment.



Close View of the Raised Numbers on Radio Tuning Dial, and Blind Man Demonstrating Their Use

¶ During 1926, more than 22,000,000 motor vehicles were registered in the United States.

Flirting with Death



By HAMILTON WRIGHT, JR.

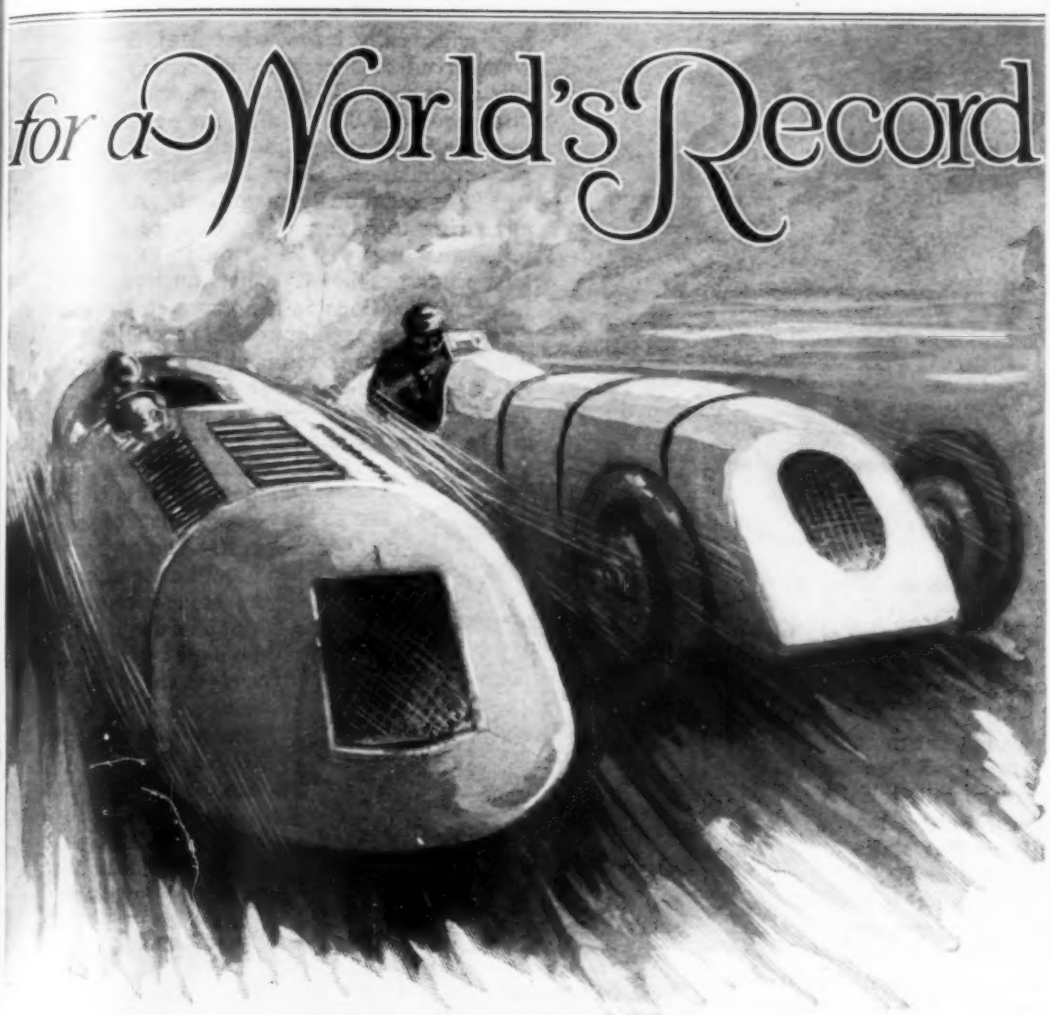
HURTLING down a straightaway at nearly three and a half miles a minute, a thirty-year-old English war veteran recently covered the famous speed course at Daytona beach, on the Florida east coast, faster by far than man has ever moved on land.

Riding in the biggest racer ever built—a car almost thirty feet long, six feet wide, and so packed with machinery, including two huge 500-horsepower engines, that there was only room for one small seat—Maj. H. O. D. Segrave set a mark of slightly better than 207 miles an hour with the wind and more than 200 miles an hour against it, for an average speed of 203.79.

In a time so brief that it was measured in split seconds, he went so fast that a spectator who blinked his eyes didn't see him go past, for his speed was about 300 feet a second. In four-tenths of a second—the time it takes for the hand to act on a message from the brain—he traveled nearly 150 feet. At that speed, had the front wheels of his car been twisted ten degrees from their straight path, the rider probably would have been dead before the hand could act, for the wind resistance was so great that even that slight swerve would have sent the car somersaulting over the sands.

Born in Baltimore, Md., of English par-

for a World's Record



ents, thirty years ago, Maj. Segrave for fifteen years has worked, trained, slept, eaten and talked with one thing in mind —speed. When the dream came true at Daytona beach, he was at the wheel of a car that cost $100,000 to build, besides another fortune to bring it to America for its trials, and that, in the words of its driver, "has no practical use." It is a speed creation, pure and simple.

His record was made on the same stamping ground where famous speed kings demonstrated new possibilities for swift transmission many years ago. Alec Winton, in 1902, roared over this very same course for a mile in fifty-one seconds flat. Then came W. K. Vanderbilt, who negotiated it in thirty-nine seconds. Later Louis Roth of Boston made the mile in twenty-eight and three-fifths seconds in a Stanley steamer. Victor Demogoet, of Paris, made two miles in fifty-eight and four-fifths seconds in a Darracq. Bruce Brown, in 1911, made ten miles in a little over five minutes. All these records were capped by the three-mile-a-minute pace set by Sig Haugdahl, Norwegian speed king, April 6, 1922.

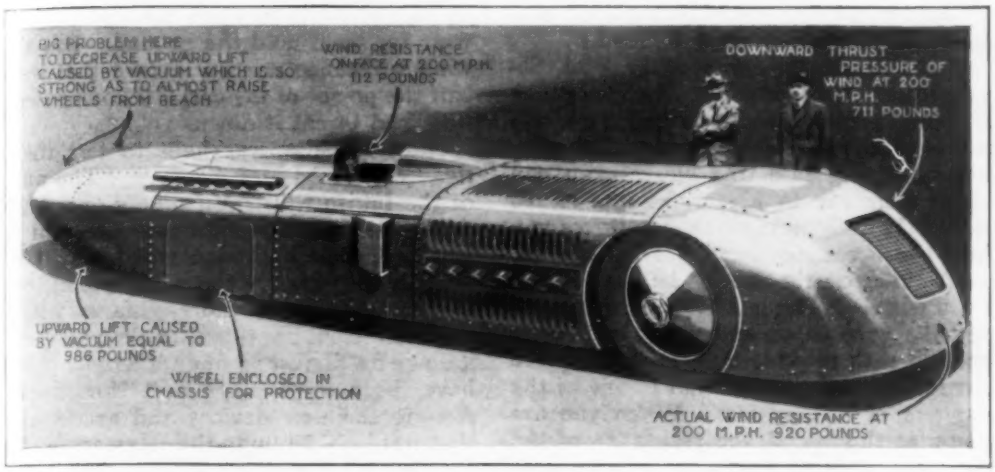
Maj. Segrave is a daring aviator with a splendid war record. Realizing the desperate nature of his long-planned test, he brought with him seven of the finest mechanics in all England and four experts from leading automobile concerns. Eaclr man had been trained to his capacity and knew just what to do to get the maximum

W. K. Vanderbilt at the Wheel of the Mercedes, in Which He Made a Mile in Thirty-Nine Seconds on Daytona Beach in 1902, When Auto Racing Was Confined to Wealthy Sportsmen

speed from the "Mystery-S," as his car was called. Each knew that a man's life was at stake in this attempt. To withstand the peril of such speed, every nut and bolt, valve and spoke had to be super-perfect. Nothing could be taken for granted. There were ninety-six valves, twenty-four pistons, super-crankshafts, vacuum brakes, wire wheels, every spoke of which must be perfect, and a thousand other important parts to look after, some of which had never before been seen in this country. These men were the advance explorers into the new continent of speed which lay in a plane above that already explored.

There are perhaps no more than a hundred people, close students of racing, who really know what Maj. Segrave was forced to overcome in accomplishing this great feat. When the wheels revolve at a speed of 2,000 revolutions per minute, one of the greatest difficulties to secure is perfect balance. Any inequality in the tire is tremendously magnified. A wheel appearing to have perfect balance at fifty miles an hour may be thrown out of balance after passing 100 miles an hour, setting up vibrations in the car which make its maximum speed impossible even though wind resistance is reduced to a minimum. At a 200-mile-per-hour speed, the rubber must hold as true as a steel wheel and not fluctuate even a fraction of an inch. The centrifugal force is so great that tires, rims and wheels have a tendency to come off or fly to pieces. No longer is the weight they bear a factor. It is the strain of another force. To keep the tires on at such a high speed, Segrave was obliged to have nearly 100 pounds' pressure

Maj. Segrave at the Wheel of "Mystery-S" and Giant Car Itself as It Appeared on the Florida Beach



The Fastest Thing That Ever Ran on Land, Maj. Segrave's Giant 1,000-Horsepower Car; First Automobile Racer to Be Equipped with Two Engines and Perfect Streamlining

in the tires. They had to be very thin to overcome heat resistance. It sometimes takes weeks to balance a wheel perfectly. When traveling over 160 miles per hour in an ordinary racing car, the resistance of the air overcomes the traction of the rear wheels and they do not take good hold on the ground. This was, to a large extent, overcome in the "Mystery-S," by the great weight of the car and the partial inclosure of the wheels by the chassis. Moreover, the vacuum created in the rear of the rushing car tends to lift the back wheels, while it is conceivable that the downward pressure exerted by the wind on the nose might cause the car to somersault. The front and rear-end design of the "Mystery-S," while not radically different from that of other racing cars, is more pronounced to meet these problems.

Maj. Segrave has always been speed-crazy. Nothing moves too fast for him. He talks fast, eats fast, thinks like lightning and can't sit still a minute. And yet he knows his car better than its creator, Louis H. Coatalen. If a valve, one in ninety-six, wasn't working right, as he coasted to the beach pits, he'd tell the mechanic just which one it was.

"Suppose your car caught fire when you were traveling about three miles a minute," he was asked, "would you have driven it into the ocean as so many others have done?"

"I don't know," he laughed. "It takes me two miles to stop and if I ever hit the water, even by accident, the impact would crumple us up as if I had struck a stone wall going sixty. It took about three miles before she was wide open, two to set the record and two to stop. During that two-mile stretch, when I was going around 200, the wind was so terrific as it roared by my ears, that I feared I would have been knocked unconscious, had I leaned beyond the protection of the built-in cowl. This pressure of the air when proceeding at a velocity of 200 miles per hour is equal to a weight of 112 pounds hanging from one's nose. It took fully 500 horsepower, one-half the entire power of my car, to cut down wind resistance at that speed.

"At 200 miles an hour the car has a great inclination to get up and fly. Had any strong gust of wind struck the car when I was going my fastest, I would have been turned over. It's like an airplane hitting a hill. During the tests we made a few days previously, gusts of wind would strike the car at 150 miles an hour and it felt as though I had hit a bale of hay. Even a cross wind of only eighteen miles made it extremely difficult to keep the car from sliding inside."

The beach at Daytona is some twenty-seven miles long and about 500 feet wide at low tide. It is the smoothest natural stretch of land in the world suitable for auto racing and is much sought as a winter and summer resort. The sand is hard-packed. An ordinary touring car leaves only a hair-line mark when slowly moving over it. It is hard because of the fact that its great width has permitted the tide to continually

roll and grind the sand, reducing the grains in size and packing them tightly.

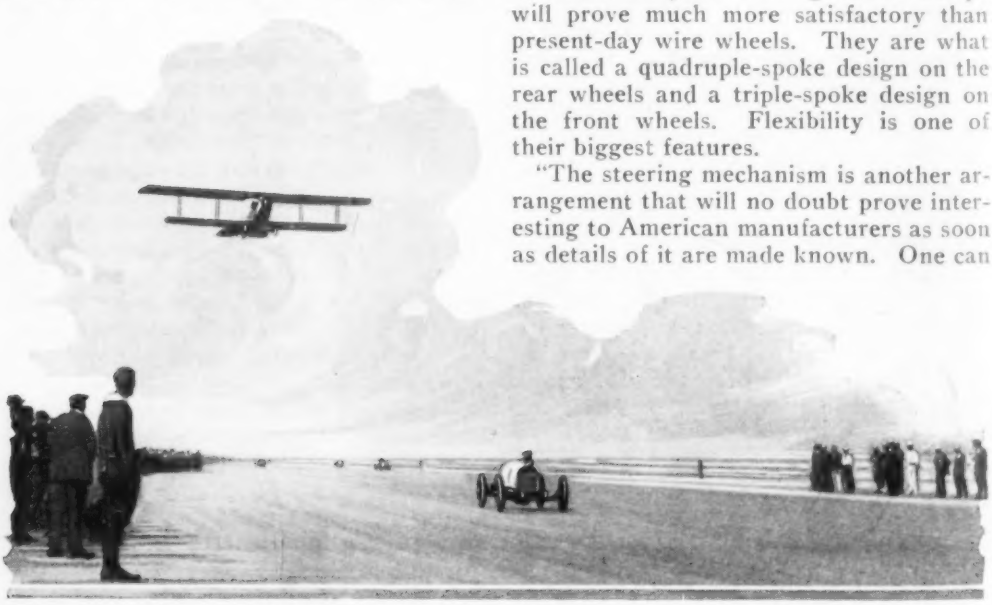
The dangers encountered by Maj. Segrave were confirmed by Sig Haugdahl, who on the same beach thrilled the world a few years ago. At a speed of 180 miles per hour, Sig said, the closest you can drive your car to a straight line is 100 feet. "The slightest move may throw you into the ocean on one hand or into the sand dunes on the other," he said. "The front wheels, turning at 180 miles per hour, act like gyroscopes and won't turn quite enough with the steering gear to keep the car in a straight line. That is one of the dangers of driving fast. When you are going at this speed, the resistance of the air overcomes the traction of the rear wheels and they do not take hold on the ground. The currents of air on the beach move the car. You keep your foot on the throttle and pray to God."

Maj. Segrave came to Florida with a car well prepared to overcome these difficulties. "We built an exact model of the car in miniature and tested it out in a wind tunnel at Vickers', in Weybridge, England, to see how it would act at 200-miles-per-hour wind resistance," he said. "At 210 the wind resistance is figured at 1,020 pounds and at two hundred, 920 pounds. The model we built looked pretty good and I figured that, when the two engines were in, she'd hold the ground. But the wind resistance was so intense that over half the power of my car, 500 horsepower, was used to cut it down.

"This machine was built to test theories," continued Maj. Segrave. "The auto of the future will travel ninety or a hundred miles an hour. In America and in England, superhighways will be built to allow a very high speed. In England we have several great thoroughfares where you can step on the throttle and hold it down for almost an hour at a time. They have been especially built for speed. Among the new devices and accessories that were placed upon the 'Mystery-S' for the test was a new type of tire which, because of its thinness to resist heat, eliminates a great amount of wear that comes from friction. The tires become so hot at high speeds that thin rubber at present is the only relief known. Centrifugal force stretches the tire fully an inch and a half at 200 miles an hour. The rubber is only one-sixty-fourth inch in thickness.

"We have new alloys in the engine to be tested. An alloy that will stand up under vibrations at such a speed will last on an ordinary car for nearly twenty years or until it is obsolete. The spokes in the wheels embody a new design that we hope will prove much more satisfactory than present-day wire wheels. They are what is called a quadruple-spoke design on the rear wheels and a triple-spoke design on the front wheels. Flexibility is one of their biggest features.

"The steering mechanism is another arrangement that will no doubt prove interesting to American manufacturers as soon as details of it are made known. One can



From a Standing Start, This Small American Racer Beat an Airplane over a Mile Course at Daytona; the Jump from the Start Gave the Automobile the Advantage

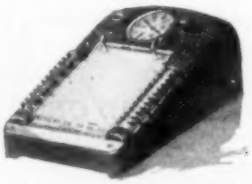
Barney Oldfield Getting the Checkered Flag at the End of a Mile in His Famous "Blitzen Benz" at Daytona; Maj. Segrave Followed the Same Course in Making His World's Record

steer the car at 100 miles per hour with almost a thought, and, no matter what contour the road might take, the front wheels tend to hug the ridge or top."

The car cost well into $100,000. It is practically useless for anything but experimenting and breaking records. The two engines eat up one and one-quarter gallons of special fuel every mile. It can run on one or two engines. In actual practice, the rear engine is first started up by means of compressed air. The front engine has one, while the rear motor requires two radiators. There are four valves per cylinder and two spark plugs; also four magnetos for each engine, and all valves are operated by means of overhead cam shafts.

ALARM-CLOCK MEMO PAD AIDS IN KEEPING APPOINTMENTS

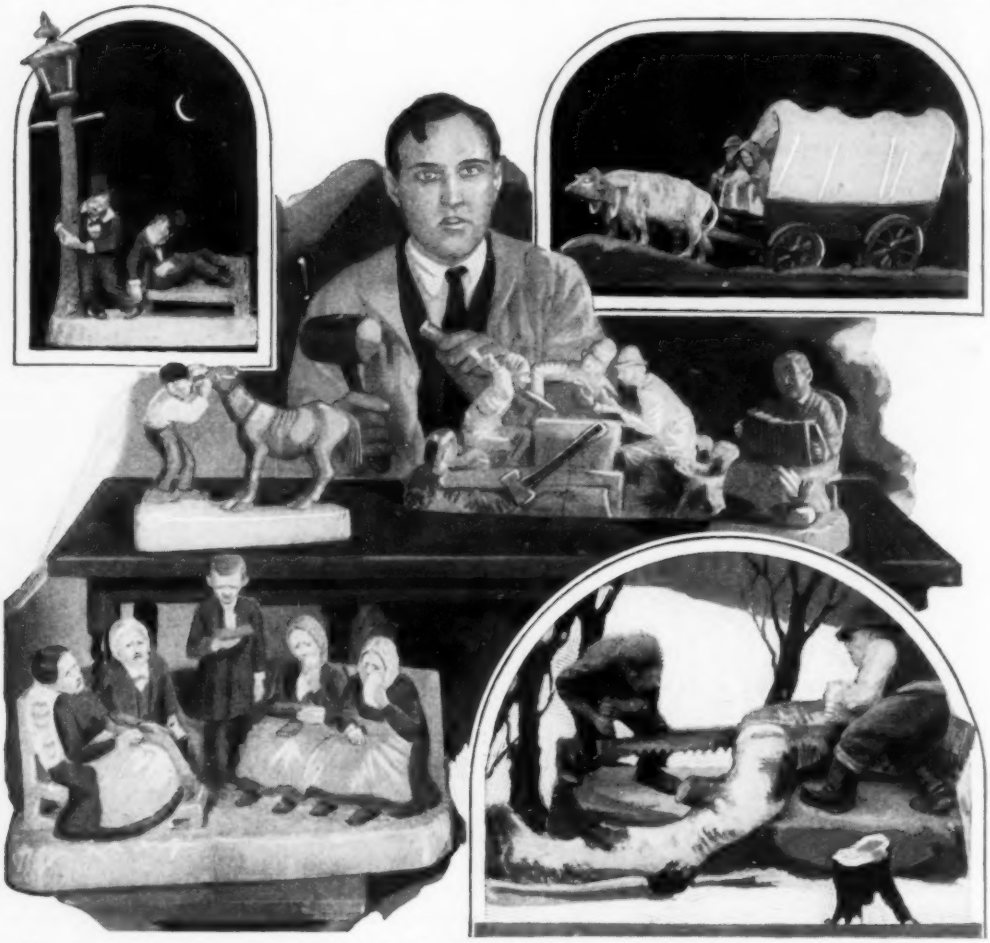
Besides reminding the business man or other worker of his appointments, a desk memorandum device, introduced in France, keeps an accurate record of tasks performed at any hour of the twenty-four, so that the report may be filed away for reference. It has several features not found in other units of its kind. For instance, there are keys at the side of the memo blank which may be set for any hour of the day and, when the time is reached, the clockwork mechanism rings a bell. The record sheet is divided into spaces for appointments at intervals down to five minutes apart, and there is another division for general notations. The reminder is especially adapted to process work, as in a factory where experimental tasks are under way. The record sheets would give timely notice when certain things were to be done in a test, for instance, and they could be kept for later consultation.



SANDWICH MAKING AN INDUSTRY THROUGHOUT UNITED STATES

Sandwiches are now considered one of the leading industries in the United States, the total revenue from this popular form of food approaching that from motor cars and movies. From careful estimates, it is believed that at least 1,000,000 sandwiches are eaten every working day in the Broadway restaurant district in New York alone. Figuring each one at a cost of twenty cents, a moderate amount, the daily revenue in this section of the city alone would be $200,000 or more than $70,000,000 a year. These figures are believed to be typical of many other parts of the country.

ARTIST TURNS WOOD BLOCKS INTO MASTERPIECES



How Carl Hallstahammar Reveals Life in Wood; the Artist and Examples of His Work; the Groups Are Carved from Single Blocks, Not Fabricated; Color Is Applied to Emphasize Features

With three or four chisels, a saw, mallet and a few pieces of basswood or pine, you can be a wood sculptor if you have the talent. This last and most important item is likely to be overlooked on a first visit to the studio of Carl A. Hallstahammar, Swedish craftsman, for his entire equipment is no more elaborate than that mentioned above, and the ease with which he works makes the task appear extremely simple. He uses few drawings or outlines, developing the work directly from the wood block. His studies are not built up from smaller units but are made entirely from a single piece. Color is used to give expressions and costumes more realistic appearance. Through the medium of wood, the sculptor depicts his subjects in many moods with the skill of the cartoonist. The pieces have been accorded wide recognition in this country. He began carving when he was twelve years old.

DIAMOND ONCE AN IDOL'S EYE BROUGHT TO AMERICA

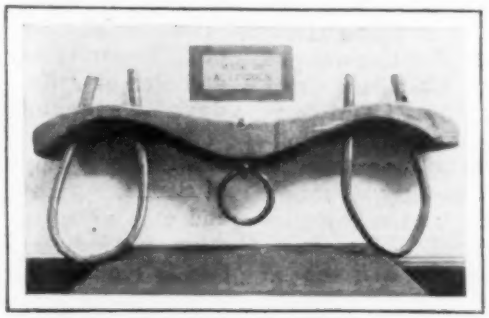
One of the world's most famous precious gems, the Nassak diamond, has been purchased by a New York jeweler. In 1911, it was valued at $148,000 but just recently it was appraised at $400,000 in view of the increased price of the stones and its unusual history. Originally, the diamond is believed to have come from a temple about

100 miles from the present city of Bombay, where it had been set in an image of the god Siva as a glittering eye. The stone was taken from an Indian prince and came into the possession of Warren Hastings, who sold it to the East India company. A London jeweler purchased it and subsequently it was recut into smaller dimensions but better shape by the then Marquis of Westminster, who bought it in 1831. It had been in the family continuously since the purchase by the marquis until it was bought by the New York dealer. It is said to be the only large blue-white diamond that is owned by a jeweler.

Rounding One of the Seventeen Curves on the Garage Race Track; a Thrilling Moment on the Outer Ramp

YOKE LINCOLN CUT PRIZED RELIC AT UNIVERSITY

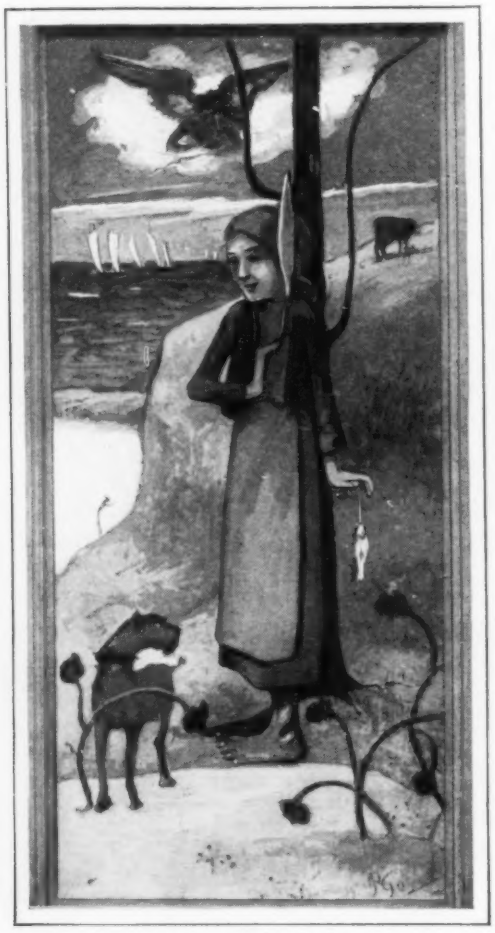
That Abraham Lincoln's woodworking activities were not confined entirely to splitting rails is seen in the sturdy ox yoke he carved from black walnut and hickory and which is now one of the highly valued relics on display at the university of Illinois. It was fashioned about 1830, while Lincoln was living at New Salem, Ill. His brother-in-law, Clark M. Smith, bought it at an auction sale and later placed it on exhibition in his business office in Springfield when Lincoln was elected to the presidency. He finally decided to give it to the university. The yoke is kept in a case of oak boards from the floor of the Lincoln home in Springfield.



Carved by Lincoln and "Rescued" at an Auction Sale, the Ox Yoke Now at the University of Illinois

AUTO RACE ON GARAGE RAMPS TESTS SMALL CARS

Racing from the second basement to the seventh story of a Paris garage, on the outer ramps used to transport cars from one level to another, gave French drivers a chance to test their skill and the flexibility of their autos recently. The course also had curves which were rounded at high speed, showing the efficiency of the small car, as compared with larger ones.



Found under Wall Paper at French Inn, Fresco of Joan of Arc by the Late Paul Gauguin

RARE MASTERPIECE IS FOUND HIDDEN ON BRICK WALL

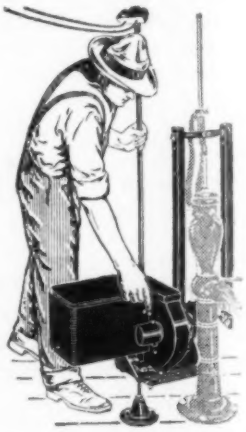
How a torn piece of wall paper led an American artist to discover a lost painting by the late Paul Gauguin, is a romantic incident of recent happening. The artist had entered the little inn of Marie Henri in Brittany, not knowing that this was one of the favorite retreats where the great Gauguin often amused himself and companions by painting on the walls and ceiling when unfavorable weather prevented work outdoors. A tear in the wall covering revealed a bit of color on the brick beneath. The artist removed all the paper, exposing what proved to be a fresco of Joan of Arc, by Gauguin, and another painting by DeHan, a contemporary. They had been covered by layers of wall paper and lost for years. The nature of the find was explained to the amazed woman owner of the inn; she was paid for the paintings, and then came the work of their removal. Parts of the wall on which the frescoes were made, were braced, carefully cut out and lowered to the floor. The backs were next reinforced with cement and steel and the paintings taken to Paris. The removal was considered remarkable, because no mortar was broken from the pictures during the process. They are to be exhibited in America soon.

NON-SINKABLE SURFBOARD MADE OF METAL

Weighing but thirty pounds and constructed so that it cannot sink or capsize, a surfboard of novel form has been introduced in California. Its fish-pattern design affords a saddle and a chin rest for the rider and propulsion is obtained by a hand-over-hand crawl stroke and foot movements. For those who desire it, a set of paddles can be attached, although these have not been found practical in rough water. Frame and breast board are of duraluminum.

ELECTRIC DRIVE FOR PUMPING EASILY INSTALLED

Especially adapted for a home waterworks system, an electric drive can be quickly attached to the pump, operates indoors or out and, in emergencies, may be run with a gasoline engine or by hand. The stroke is adjustable to fit wells of different depths and size of cylinders. Patented features are said to afford economy of electric current and ease of operation. No foundation is required for the rig, which loops around the pump or well casing. Gears, sprockets and chain run in an oil-tight dust-proof box, making lubrication easy.



Demonstrating the Circulation in the Holland Tunnel with Smoke Bombs; Note How the Smudge Is Being Drawn to the Ceiling; It Failed to Spread More than Fifty Feet in Any Direction

SMOKE BOMBS IN AUTO TUNNEL TEST VENTILATION

The efficiency of the ventilating system in the Holland vehicle tunnel under the Hudson river was graphically illustrated recently when smoke bombs that gave off fumes, equivalent to those from hundreds of automobiles or a good-sized fire, were lighted in the passage. The smudge failed to spread more than fifty feet in any direction and within two minutes after the bombs were exhausted, the tunnel was practically clear of the last trace of smoke. Circulation is effected by batteries of fans, eighty-four in all, half of which blow pure air into the tunnel while the rest draw out the gases and used air. The fans are operated by twenty-five-horsepower motors and are run according to traffic conditions.

SAIL LIZARD ROAMED AMERICA MILLIONS OF YEARS AGO

Discovery of fossils and skeletons is constantly helping scientists to reconstruct a picture of the world as it probably was long ages ago. Recently, a party from the University of Chicago found the skeleton of a sail lizard in rocks while specimen-hunting in Texas. The discovery enabled scholars to correct a minor point, for the skeleton showed that the lizard had a long tail instead of a short one as had been supposed. It is thought to have lived on this continent some 20,000,000 years ago.

Reconstructed from Fossil Remains Found in Texas; the Sail Lizard As It Probably Appeared

SPIRIT OF ANCIENT CHINA STILL CLINGS TO

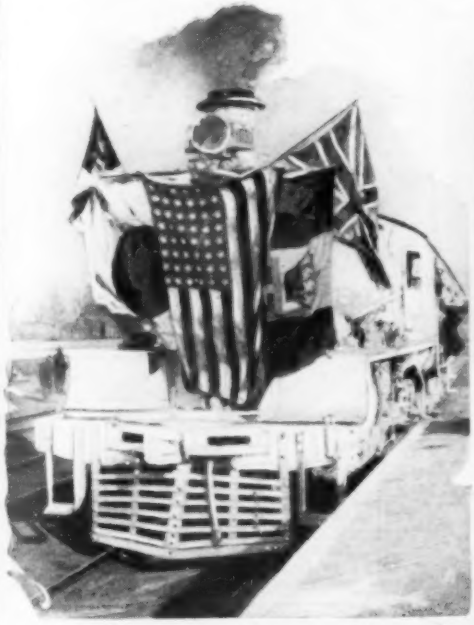
Chinese Fortune Tellers Have Been Working Overtime during the Recent Warfare, for They Are Highly Honored Citizens, and Always Believed; Above Is One of Them, Reading the Fate of an Ancient Patriarchal Fakir, While the Neighbors Look On

Chinese Students in a Christian Missionary Workshop Weaving a Rug; Carpet Making Is One of the Chief Industries, and Fine Examples Command Big Prices

Chinese Soldiers and Their Equipment; the Umbrellas, at Right, Resemble the Huge Shields Worn by Knights of the Middle Ages

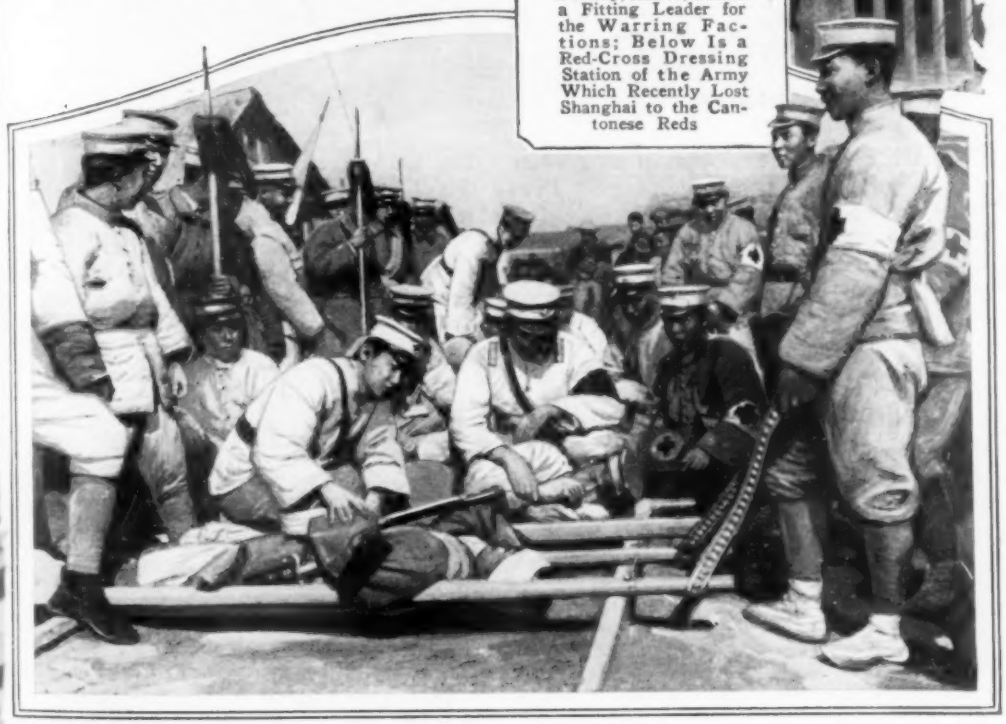
Top and Center © D. C. Thompson; Lower Photos, Courtesy Illustrated London News

SOLDIERS WHO CARRY UMBRELLAS TO WAR



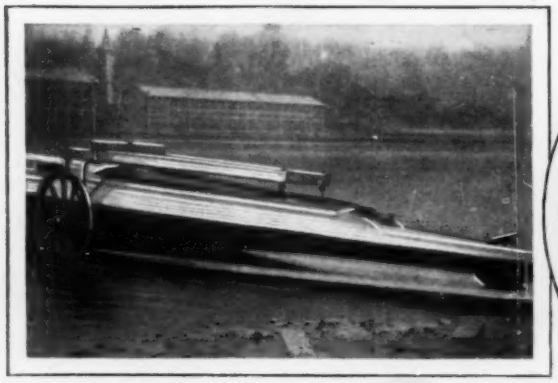
The "White Train of the Whites" Which Carries Foreigners from Tientsin to Pekin under the Protection of the Festooned Flags of the Allies; Despite the Warning White Paint It Is Often Fired Upon

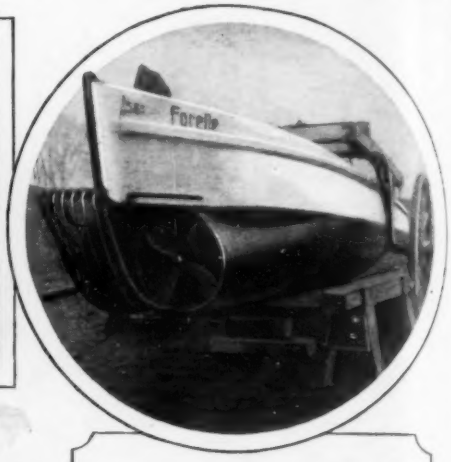
The Chinese God of Destiny, Above, Seems a Fitting Leader for the Warring Factions; Below Is a Red-Cross Dressing Station of the Army Which Recently Lost Shanghai to the Cantonese Reds



Top, Left, © D. C. Thompson

FISHES' SECRET SOUGHT TO ADD SPEED TO BOATS





Above, German "Fish Boat," Showing the "Gills" through Which It Sucks Water; at Top, Left, the Boat Being Launched in a Wheeled Cradle, and, Below, as It Appears When under Way

Hunting for an explanation why some fast-swimming fish had more gills than their slower brothers, a German inventor, A. Boerner, of Dresden, has evolved a new type of boat that breathes water and even has scales along its sides. First tests showed that his boat, the "Forelle," which is German for trout, developed extraordinary speed in proportion to its size and power. It is about thirty feet in length, and driven by a six-horsepower engine. Boerner decided that the accepted idea that a fish propelled itself by means of its tail fin, was not entirely correct, after investigating fast sharks that had as many as five gills, whereas slower-moving fish got along with two. His theory is that the fish take in water through the mouth, then compress the gill bags, to get pressure, and eject the water backward through the gills, with the result that it covers the body with a thin sheath of water and eliminates the "skin friction" which holds boats back. The fish's scales, he says, act to break up whirls in the water, since any current trying to move forward raises the scales, just as the hand does when brushed from the fish's tail toward its head, and so the current is converted into a propulsive force. To supplement the film of water, the fish also exudes an oily scum which covers the body. To test his theories, Boerner built the "Forelle." Beneath the water line, at the bow, the boat has two large open tubes, one on either side of the stem, and in each tube is a turbine wheel, geared to the engine. The water sucked in through the turbine is expelled through rows of small nozzles along the sides and bottom of the hull, while scalelike embossings on the hull surface break up whirls and convert their action into forward power. The nozzles are so placed as to envelop the hull in a film of water, cutting down the resist-

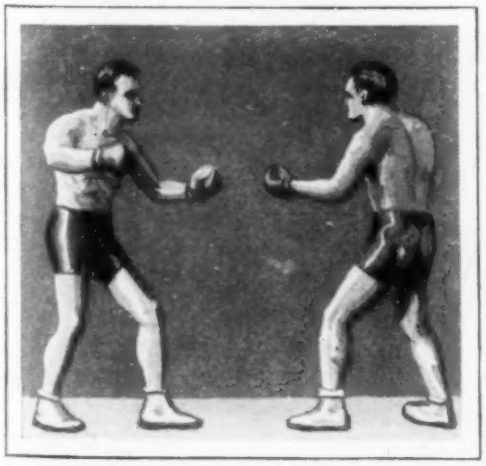
ance of the water. Steering is taken care of by reducing the flow of water from the nozzles on the side toward which it is desired to turn.

STAMPS PRINTED BY THE MILE

In Franklin's day, letters were sent and charged for by the sheet and the distance they were carried. Ten cents was the rate for one sheet, twenty for two, and so on. For every fifty miles, an additional charge was made. There were no envelopes, the sheets just being folded and mailed. Today, there are so many letters that stamps are literally printed by the mile. Some 1,500,000 letters are mailed each hour of the twenty-four in a day. To carry the year's letters, 15,000,000,000 postage stamps and 60,000,000 special-delivery stamps are sold. More than 1,500,000,000 postal cards are used yearly. The government has 30,000 railway postal clerks who cover 220,000 miles daily in handling the mails.

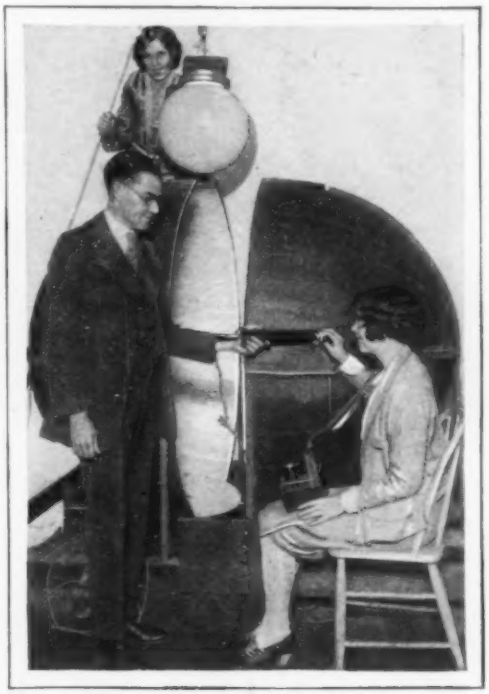
RUBBER KNEADED LIKE DOUGH MOLDED INTO DOLLS

Kneadable rubber that can be fashioned into many objects, such as dolls, decorations, masks and other things, has been developed by German chemists. It is colored so that figures can be imitated in a realistic manner and the substance clings together firmly so that almost any posture can be reproduced, depending upon the skill of the modeler.



Boxing Dolls Modeled from Rubber "Dough"; the Substance Clings Together Firmly

STREET LAMPS TESTED TO SHOW IF LIGHT IS WASTED



Testing Street Globes to Determine Their Efficiency; Amount of Light They Pass Is Accurately Gauged

Certain kinds of colored-glass globes on street lamps restrict more than half of the light, while other types are almost as inefficient, according to interesting tests made under the direction of Prof. L. T. Clark, at the University of Southern California. To find out how a lamp is "behaving," a study is first made to determine if the rays are being projected in a direction that will not serve the public, or if the light is properly shed to give the street the best possible illumination. Then, light, globe, and all, are placed inside a hollow sphere which is painted white on the interior, a measuring apparatus is inserted in a hole in the side of the sphere and the amount of light actually passing through the globe is accurately gauged. It was discovered that plain, round, shades of the ordinary kind, allow about eighty per cent of the light to pass through. Those less efficient were mostly of art-lantern type.

¶ By recent count, the earth has 430 active volcanoes.

Capt. Harris and One of the "Mercy Bullets" Intended to Render Animals Unconscious from Anæsthetic

"MERCY BULLETS" TO SUBDUE JUNGLE BEASTS FOR ZOO

Bullets tipped with a half-inch barbed needle which will inject an anæsthetic into an animal, so that it can be captured alive and without undue suffering, are to be used by Capt. Barnett W. Harris in hunting specimens for the proposed Chicago zoological gardens. Beasts unsuited for the collection will be allowed to escape after they have revived from the effects of the drug, while those that are wanted will be bound and made ready for shipment while unconscious. Capt. Harris plans to go to Borneo, Sumatra, Australia, India and Africa in his quest for animals.

CARING FOR THE LINER

When an ocean liner has been docked, the officers and crew often begin their hardest work, for between the docking and departure, the great ship must be thoroughly overhauled and cleaned. One of the first tasks is the repainting of the hull. Next, the funnels must be scraped and brightened with a fresh coat. The mere cleaning of a first-cabin dining room is a huge task in itself. Such a room may seat from 500 to 600 persons. The carpeting must be vacuum-cleaned, tables polished and all the interior decorations minutely inspected and restored. It is necessary to count, sort and check some 35,000 pieces of linen. Glassware on a liner seldom numbers less than 25,000 to 30,000 pieces.

COWBOY ROPING GEAR REDUCES STRAIN ON HORSE

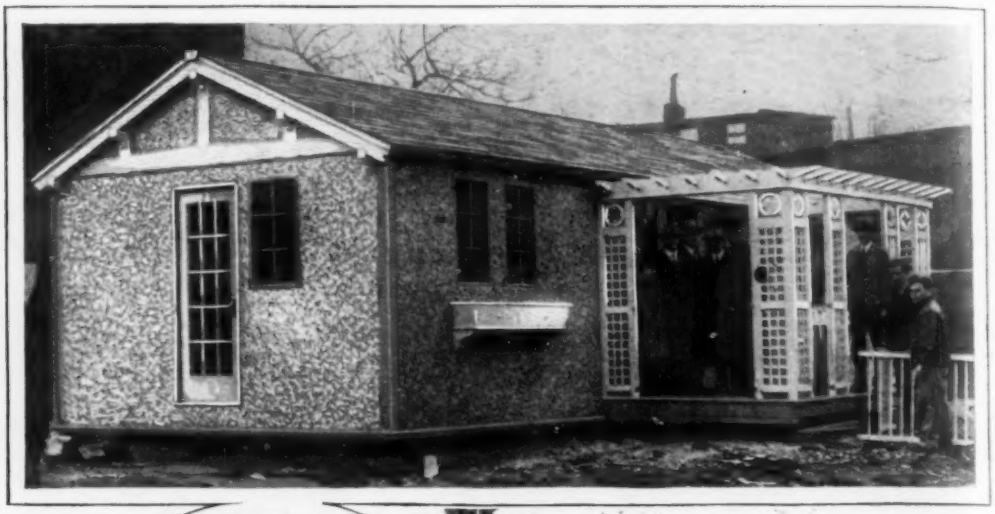
Pulling up short on a plunging steer at the end of a lariat involves considerable strain on horse, saddle and other equipment; so, to ease the cow pony's work and insure greater safety, an Idaho man has devised an improved roping gear. It is a variation of the breast collar. Its two sides, instead of fastening together at the top of the horse's neck, are buckled to straps attached to the saddle just under the two front strings. The sides of the rig lie along the animal's shoulders and do not interfere with its movements. The tie-down snaps into a small ring set in the center of the breast piece. This arrangement is said to eliminate wear on the horse's neck, holds the saddle in place in heavy roping, preventing complete turn-overs even if the seat is loosely cinched, and since the pull is distributed to the horse's breast, it gives the pony more power.

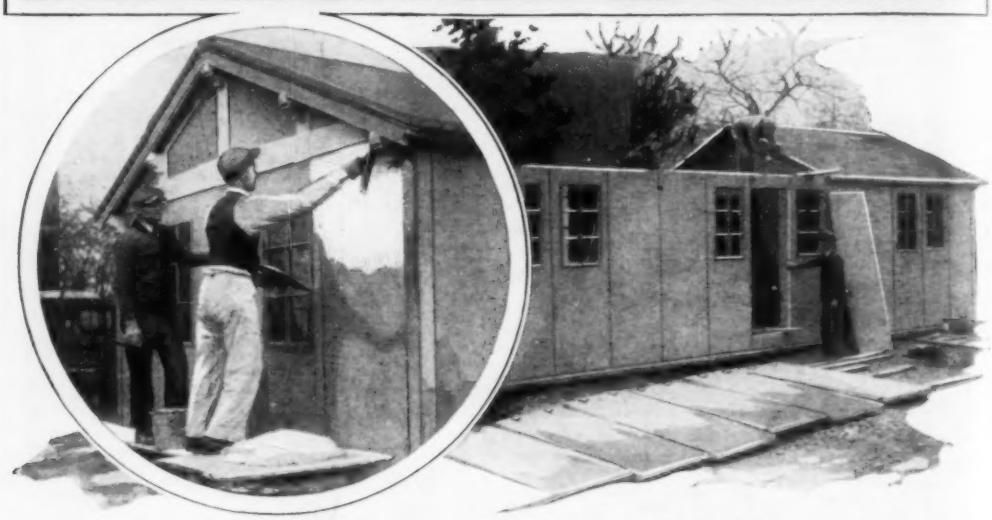
Roping Gear Adjusted on Horse, and Drawing to Show How It Is Attached to the Saddle

FROM RAW MATERIAL TO PLANES IN TWO WEEKS

Naval Planes Are Being Turned Out Complete at the Philadelphia Factory in Two Weeks and Are Then Ready to Be Placed aboard the Aircraft Carriers; the Top Picture Shows the Fuselage-Assembly Department with Rows of Frames for Fast Scouts; Below, the Engines and Side Panels Have Been Added, and in the Background Wings Are Being Attached; at Left Is a Barge Load Bound for the Ship

HOME IS BUILT WITH WRENCH IN EIGHT HOURS





Completed House and Stages in Construction; the Units Are Joined by a Special Rod Arrangement with a Monkey Wrench, So That No Hammer Is Necessary; the House Contains Three Rooms and Bath

To demonstrate a means of solving the housing problem in the army, a home with three rooms and a bath was put up by three men in eight hours. A monkey wrench was the only tool used in the actual construction, as the sections were joined by a patented arch-rod system. The principal material was a kind of synthetic lumber and, while the house was said to be portable in that the parts could readily be taken apart for reconstruction elsewhere, the finished structure was permanent and regarded as strong enough to resist severe storms and earth tremors. No foundation was necessary. Stucco was used for the outside finish. The total cost was said to be twenty-five per cent less than with ordinary methods.

TASK OF WEIGHING THE EARTH TAKES SEVEN YEARS

Begun by the bureau of standards seven years ago, the job of weighing the earth is not quite finished, but Dr. Paul R. Heyl, government scientist and official weigher, expects final calculations to show that the figure already reached is not more than a

few million million million tons in error. Under present estimates, the world weighs five sextillion, nine hundred and ninety-seven quintillion tons. Calculations show that it is five and one-half times as dense as water, or, in other words, it would take five and one-half globes of water the size of the earth to balance the weight of the sphere. The atmosphere around it weighs five million million tons, the entire population less than one 400-billionth part of the whole, and the earth is believed to be solid from surface to center and of about the same rigidity as steel. A miniature system of planets are used for the weighing. They are in a room thirty-five feet below the street, in the bureau of standards building at Washington. Two little platinum balls are suspended in a vacuum and permitted to swing in response to the gravitational attraction of two cylinders, each weighing 104 pounds. The distance of the swing is measured as accurately as possible to obtain a constant upon which to base comparisons indicating the weight of the earth. These measurements must be repeated thousands of times to eliminate error.

FLOWERS AND FACES OF SHELLS LATEST ART NOVELTY

Painting seashells to represent flowers, faces, birds and other objects and then mounting them, is the novel occupation of a California woman who has found a ready sale for her work. The pieces are arranged with a suitable back and foreground and can hardly be distinguished as shells when properly mounted.

Fashioning Flower and Other Designs from Shells; They Are Mounted and Framed for Decorations

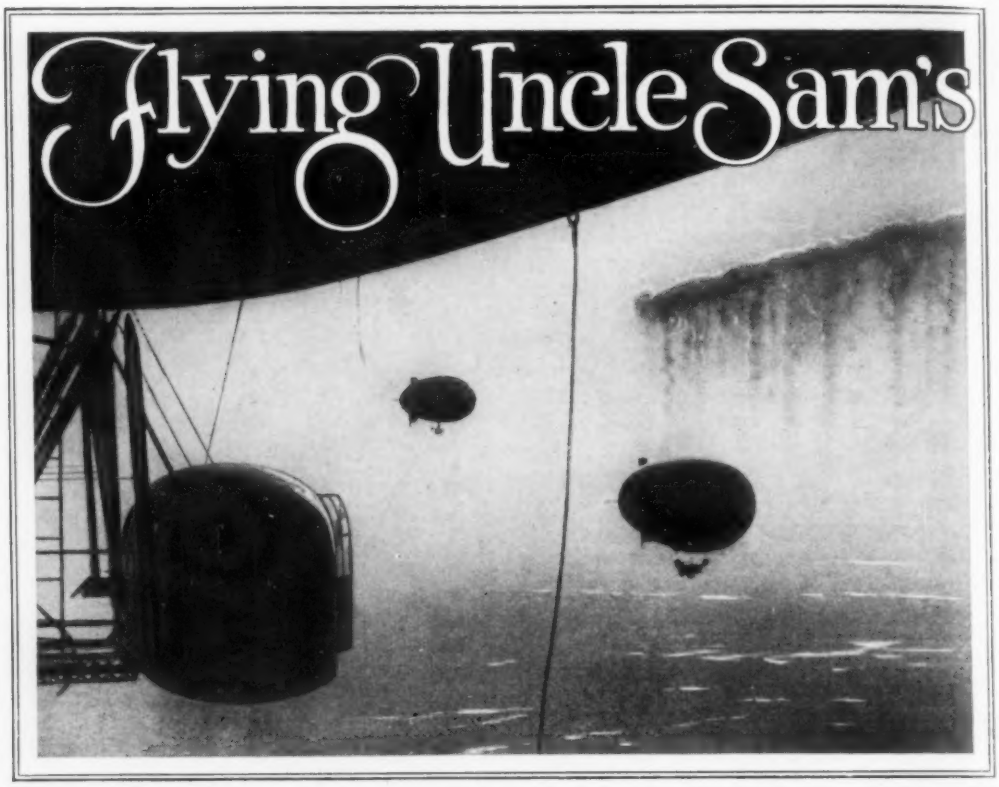
Flare Signal Which Helps Guard Traffic Policeman in London Fog and Aids in Giving Directions

LIGHTS FOR FOG ARE CARRIED BY TRAFFIC POLICE

When a "pea-soup" fog settles over London, the traffic police have to get out their kerosene flares, not only to escape being run down, but to let the traffic know when to start and stop. Usual methods do not give enough light to pierce the kind of fogs London is occasionally obscured by, so it became necessary to resort to the huge column of flame from the oil flare to do the work.

¶The Popular Mechanics Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by the bureau.

Flying Uncle Sam's



Flying in V-Formation, a Pair of Army Blimps, Photographed from the Control Car of the "RS-1," with a Smoke Screen Laid Down by a Martin Bombing Plane in the Background

A FAT little silver-gray gas bag, supporting a pair of roaring motors and an open passenger car shaped like a high-speed, flat-bottomed motorboat, comes sidling across the wind into a flying field, points its nose for the ground and drops down until a pair of drag ropes can be dropped to a waiting crew.

The ship is hauled down for a few moments, while a quartet of passengers in heavy fur-lined suits and boots climb stiffly out and others take their places. The engineer opens the gas tank, sticks a measuring wand in, cranks up the twin motors, the ground crew leaps clear and the little craft points its nose up and runs off on another two-hour training flight.

The place is Scott Field on the flat Illinois prairies, some thirty miles east of St. Louis. The airship bears about as much resemblance to the long lean, graceful cigar-shaped bodies of the "Los Angeles" and other mammoth Zeppelins as a flivver does to a parlor-car-type motor bus. Its squat little gas bag, 150 feet or so in length, is shaped like an enormous teardrop, big and blunt at the nose and tapering away to a point at the rear. Where the Zeppelin has an elaborate framework of keel and girders, the army blimps on which the soldiers of the air are trained are just gas bags. Deflate them and they collapse like a toy balloon, and collapsed the whole works, gas bag, rudders, elevators, passenger car and engines, can be stowed on one railroad car.

Only the pressure of the gas and air in the bag makes it keep its shape in flight. Even the big fixed tail surfaces, with their hinged flippers, sticking out at right angles on top, bottom and both sides to act as rudders and elevators, are supported entirely by the pressure within.

With such simple contraptions, however, the British patrolled their coast line during the latter years of the war and escorted ship convoys for 150 miles at sea, and it is their boast that they never lost a

Rubber Gas Bags

Control Car of the "RS-1," with the Elevatorman at the Left and the Helmsman Watching the Compass in the Background

ship that was protected by a blimp. For the little airships, flying 2,000 to 3,000 feet above the sea, and with a speed of fifty miles an hour, could circle around and spot the shadow of a lurking submarine long before it came to the surface or exposed its periscope.

In the big hangar at Scott Field as many as nine or ten ships are kept inflated at one time. The hangar is as high as that of the "Los Angeles" at Lakehurst, 172 feet to the top of the roof, and is even longer, being 810 feet from door to door. Out of it, the year around, in all kinds of weather, they come to train the army's lighter-than-air pilots, who are taking the hardest course of training offered by any service school in the country. The student who graduates from Scott has learned more widely diversified things in one year than other army branches require in a lifetime. When he gets through, he is not only a qualified pilot of dirigible airships of any size, but likewise an expert operator of free and observation balloons, a skilled navigator, a proficient machine gunner, a fine radio operator, an all-round motor mechanician, a good photographer, and half a dozen other things.

The course in free-balloon flying is necessary, for, when the engines go wrong for any reason, an airship becomes simply a balloon, and the pilot must know how to navigate it and bring it to earth. It was free-balloon training that saved the men who sailed away on the nose of the wrecked "Shenandoah." Five day-time flights, of at least an hour each, are made with an instructor, and one two-hour flight at night, and then the student is sent up alone to handle the gas bag without assistance or advice. The rule is to sail away before the wind for the required time, then pick out the nearest paved road, bring the balloon down beside it and telephone for a truck from the flying field.

Next comes fifty hours in captive-balloon training to be an observer. In the classroom, a reproduction of a portion of the battle front in France, twenty feet square and with cleverly concealed electric lights to indicate battery flashes, has been used to instruct the students. They sit on high benches, with field glasses at their eyes, getting the same effect as being in a balloon a thousand feet in the air, while the instructor flashes lights all

Engineer's Cockpit of a Blimp, with Pilots in the Background; the Projecting Wings Support the Two Engines

over the map and calls for their exact positions from the class.

Not until the observer's course is completed, is the student ready to go out with a blimp, first only as a student member of the crew, with experienced instructors to explain the dozens of gauges and controls and the secrets of rising, flying and landing.

The training ships are all small blimps, though the field boasts one large semirigid for final polishing off. The passenger cars are open, with a waist-high side wall, and a few deep leather chairs. No safety belts, such as airplane pilots wear, are used. In a cross wind the light cars roll through an enormous arc, until they are lying almost on their sides. Despite the rolling, the crews learn to move about at will without much difficulty.

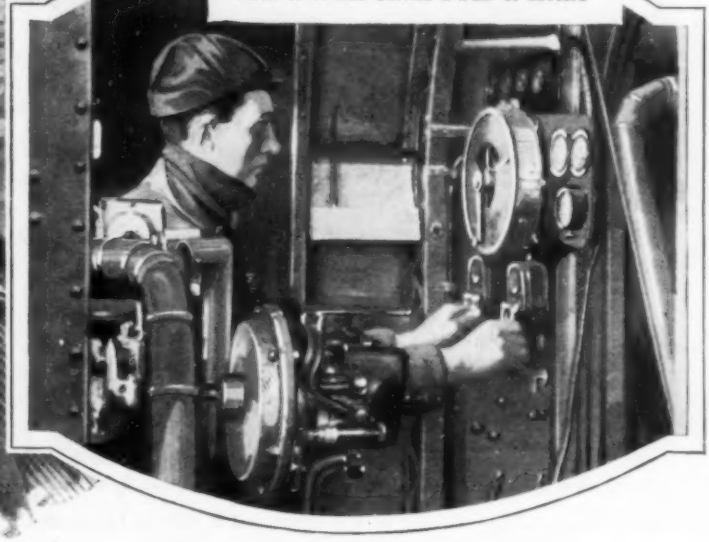
All the blimps are filled with helium gas, which will not burn but is too precious to waste, so they must be handled, if possible, without letting out gas. The lower part of the bag contains two ballonets for air, and as the gas contracts in landing, air is forced in to maintain the pressure and keep the bag filled out to its correct shape. A pair of scoops hang below the bags of the little training ships, looking much like the pipes the locomotive crews lower from wayside water tanks to fill their tenders; only, instead of water flowing down, when the scoops are lowered behind the propellers, in the rush of air driven from them, the air flows up, lifts a valve and fills the ballonets. Besides keeping the bag taut when the gas contracts, or letting off air to give the helium room to expand at higher altitudes, the ballonets also are useful in landing and taking off. When the bow ballonet is filled with air, weighting down the nose, it points toward the ground and the motors can drive the ship down despite the fact that it is lighter than air and wants to rise. And when it is time to take off, the bow ballonet is emptied and the stern one filled, the bow rises and the motors drive the ship upward and forward, instead of having it rise vertically as a free balloon normally would.

From the blimps, the new pilots graduate to the army's largest lighter-than-air craft, the semirigid "RS-1," 282 feet long, with a gas capacity of three quarters of a million cubic feet, making it about the size of the "Norge," which flew over the north pole. Unlike the smaller blimps, the "RS-1" has a framework inside its gas bag, but it consists of only a keel and a nose cap, so that when the bag is deflated, instead of retaining its shape, like a Zeppelin, the fabric bag collapses and rests on the keel.

The keel itself is just a triangular passageway, walled by balloon fabric and

A Small Blimp Ready to Cast Off, at Scott Field, Above, and, Below, the Radio Operator of the "RS-1," with the Bomb Dropper at His Feet, Sitting over the Sighting Apparatus in the Floor

The Navigating Officer of the "RS-1" at His Chart Table, Equipped with Recording Instruments, and, Below, One of the Engineers at His Post in the Gondola, Each of Which Carries a Pair of Motors



containing gasoline tanks and a catwalk by which the crew can reach the pair of engine gondolas, or climb up to a trapdoor in the nose when the craft is moored at a mast. When in flight, an engineer sits in a chair in each engine nacelle, watching an instrument board that tells how the two big engines which drive each of the propellers are working. An indicator, like those used on ships, brings him the pilot's orders from the control car, which he can see half a hundred feet ahead of him.

Between the two motor cars is a narrow metal walk connecting them, and from it a ladder leads to a hatch in the bottom of the keel, so that relief crews can come and go.

The control car itself is a two-room compartment, mostly glass in front, where a pair of helmsmen stand, one at the rudder, with an ordinary ship's compass before him, to keep the ship on its course, and the other at a second steering wheel, which controls the elevators and points the big gas bag up or down.

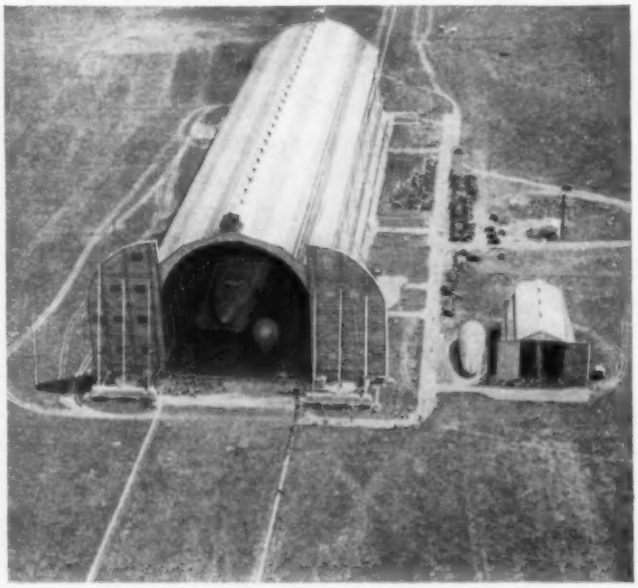
Beside them, the watch officer, keeps one eye on their activities, and the other on the controls of all the gas and air valves, the blower that takes the place of the air scoops on the smaller ships, the ballast releases and the drag ropes. The other occupant of the forward cabin is the navigator, seated at a table with the map spread before him, and, in addition to the usual instruments of a navigator at sea, a set of recording indicators that give air speed, altitude, compass course and other information.

The second cabin contains the radio operator, the bomber, who sits in a hatchway that opens up in the floor, and four canvas bunks for men off duty.

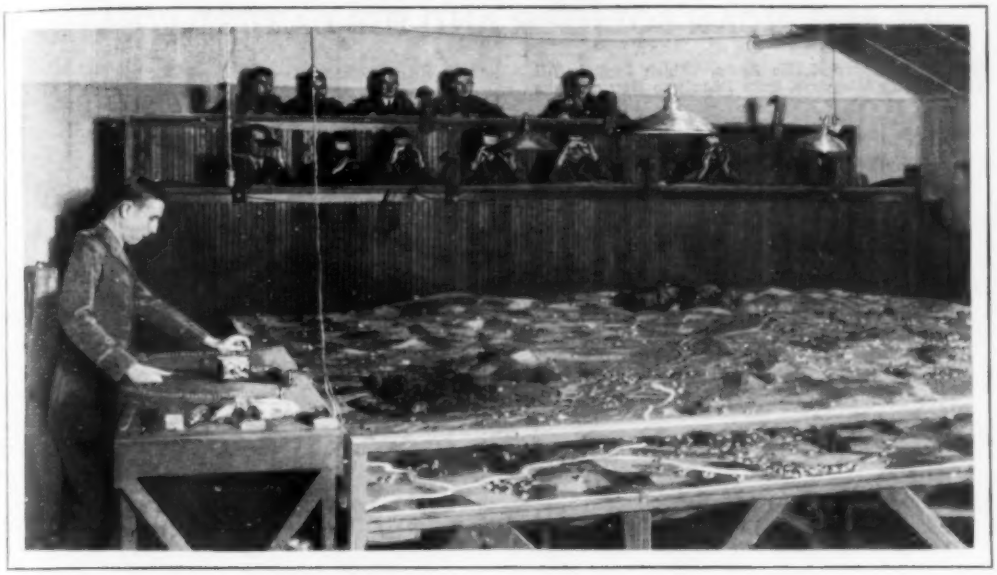
To fly a ship of that size, with the lives of a large crew at stake, requires exceptional training. Some idea of how rigorous it is, may be gained from the fact that, of twenty candidates who had been picked recently for the service, only four got by the rigid physical examination at Scott Field, and only one of the four passed the mental examinations for entrance. And by no means all of those who actually get in and take the year's course are passed as pilots or observers.

Col. John A. Paegelow, who rose from a private in the army in Spanish-American war days to be commander of all the observation balloons of the First Army in France, and is now commander of the training school, says airship piloting takes an entirely different type of man from that needed for an officer on the ground. "He has to have more self-reliance, more ability to work and to act in emergencies. Infantry on the ground could be described almost as a mob fighting. In aircraft a man is his own commanding general and he must be able to act on his own initiative—and instinctively.

"The sluggish man is no good, for his brain doesn't work fast enough. The pilot of a big airship has to have mind and muscle so perfectly coordinated that he does everything instinctively at the right moment. He



The Giant Army Airship Hangar, with a Blimp and a Balloon Inside, and Another Blimp beside the Small Balloon Hangar



How Aerial Observers Are Trained; the Class, with Binoculars, Spots Battery Fire as the Instructor Switches on Concealed Lights beneath the Replica of Part of the Front Line in France

has to feel a deviation from course or a rise or fall of a few feet and instinctively correct it. Just learning to steer a straight course is a task in itself. It is hard enough to hold a ship on its course in such a comparatively stable medium as water, and tremendously harder to do it in air, when you are at the mercy of every current, and have no foaming wake or landmarks to set you right."

Despite all its difficulties, however, Col. Paegelow believes there is a good future in lighter-than-air ships for a young man of good physique and a good education, particularly in mathematics. The future lies not only in the service, but in the commercial airship lines which, he believes, are sure to come within a few years, particularly for long routes across the ocean.

There is the same future for the enlisted men who qualify as mechanics, for they are proving so popular with commercial flying companies that many are being bought out of the service to earn good salaries with private concerns.

The piloting school is open to anyone who can pass the tests, including enlisted men from eighteen to twenty-seven. Quite a few privates have made the grade, getting the title of cadet—and three times a private's pay while in the school—and later are entitled to qualify for lieutenants' commissions.

Before they have finished the year's course, however, they have sat up many nights wrestling with textbooks that cover such subjects as army administration, field regulations, guard duty, military courtesy and customs, hygiene and first aid, military law, rules of land warfare, aerodynamics, service supply, armament, army organization, artillery liaison, free and captive balloons, communications, gas, meteorology, military sketching and map reading, aeronautical motors, motor transportation, balloon winches, parachutes, aerial photography, physics, mathematics, panoramic drawing, practical observation, tactics of balloons and airships, and an almost endless array of navigating and control instruments.

Besides the classroom work and theory, the students tear down and rebuild aircraft engines until they can do it in the dark; build and take down machine guns blindfolded; help build new ships and repair old ones, learn to rig balloons and patch gas bags, and a thousand and one other things.

When the time comes, though, to take aloft one of the smaller blimps on a solo flight, with no instructor along to give advice and only an engineer and possibly a radio operator as companions, there comes a thrill that is unlike any thrill in heavier-than-air navigation.

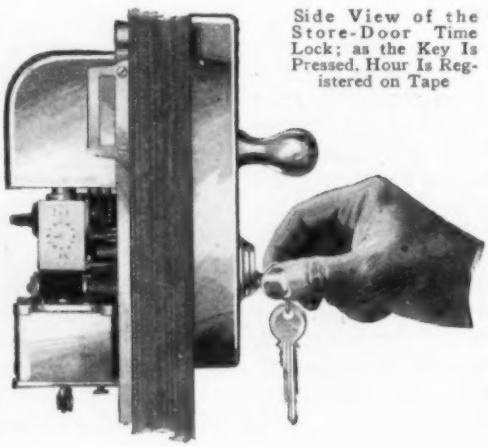
THE AMERICAN SOLDIER AND HIS LATEST WEAPONS

The Doughboy and His Arms, Which Include All the Infantry Weapons, from Pistols to Battle Tanks

Modern warfare, as represented by a group picture recently made by the war department, shows the infantry uses such varied arms that the foot soldier must be a skilled mechanic before he can fill all departments. The picture displays eight different weapons, ranging from a hand grenade to a battle tank. On the left is an infantryman about to throw a hand grenade; next a companion is loading a Stokes mortar, built to be set up in a trench to throw large bombs into the enemy lines. The third figure carries the standard army rifle with fixed bayonet, while behind him kneels a soldier with a rifle grenade fitted in the barrel ready to be fired. Next, prone on the ground, is an automatic-rifle operator with his portable machine gun, and beside him a machine gunner with a large water-cooled weapon, while a thirty-seven-millimeter field gun and a battle tank are in the rear.

TIME LOCK TELLS WHEN STORE IS OPENED AND CLOSED

Accurate record of the time the store is opened, when it is closed, and by whom, is afforded the proprietor in a special lock equipped with a clockwork mechanism and registering tape. It insures punctuality and keeping the doors open the required time to prevent loss of trade. There are six keys to each lock for as many employes. Each key has a different initial at the end. When it is inserted into the lock, it presses against a tape, registering the initial and the time when the door was opened or closed. By removing the tape at the end of any desired interval, an accurate check is obtained as to how long the store was open, who released or secured the lock each time, and when, so that any departure from schedule is plainly indicated for that period. The device is said to be especially suitable for chain stores, filling stations and similar concerns, but is equally adapted to individual shops, stock rooms and manufacturing plants.



Side View of the Store-Door Time Lock; as the Key Is Pressed, Hour Is Registered on Tape

AUTOMATIC RADIO-TUBE TESTER MAKES FEW MISTAKES

As evidence of the large-scale production that is necessary in many radio-manufacturing plants today, an automatic tube tester has been installed at an eastern plant with a capacity of 30,000 tubes a day. This is about fifteen times the number that a skilled person can test by hand in ten hours. During operation for several months, the outfit maintained an accuracy record of 99.9 per cent, the small fraction of error being charged to the accidental introduction of defective tubes into the good stock, according to the engineers. The tester consists of a revolving disk, about three feet in diameter, with sockets for tubes on one of its faces. As the disk turns, the tubes are connected successively with instruments which test them for various characteristics. Those that are defective are pushed out of the sockets by a plunger. Bad tubes are put in a scrap heap; those that can be reclaimed are laid on moving belts to be conveyed to operators for further treatment, and the good ones are sent to be wrapped.

MOTOR BUS LIKE STREET CAR HAS TWO ENGINES

Marked resemblance to a street car is seen in a forty-two-passenger motor bus, recently built for surface lines in Chicago as a "feeder" to the main system. It has two four-cylinder engines and these are placed under the center of the car. Front and rear entrances are provided. The bus weighs 13,000 pounds and costs considerably less than the average street car.

Double-Motored Bus Resembling Street Car for "Feeder" Service in Chicago

Benches Just for Two Persons Have Appeared in the Denver Parks; Occupants Face Each Other

PARK BENCHES BUILT FOR TWO TO SIT TETE-A-TETE

Fifty benches so arranged that the occupants sit opposite each other were placed in the Denver parks early this season, supplanting an equal number of the older, long kind. They are intended to make conversation easier and prevent interruption of a visit between two persons.

PLAN JAIL BREAK WITH GLIDER

Authorities at San Quentin prison in California recently thwarted what was believed to have been a jail break planned on modern lines, an attempt to escape by means of a glider. The machine, in course of construction, was found on the roof of the furniture factory. Parts had been obtained from various prison departments and the covering for the wings and fuselage was a bolt of material taken from the flag room. The builders might easily have sailed over the prison wall from the roof.

¶ Blocks of salt were once used by the people of China for paying taxes.

WOMEN IN BANK ARE TRAINED IN USE OF REVOLVER

Women Revolver Experts and a Silhouette Target as It Appeared after Practice at Forty-Five Feet

Women employes of banks in South Bend, Ind., are given revolver practice so that they will be able to cope with bandits in case of an emergency. One woman made a perfect score from a distance of forty-five feet and others showed creditable marksmanship after only a few lessons. The result of one group's shooting is indicated on the target in the illustration.

MERRY-GO-ROUND HOUSE TURNS WITH THE SUN

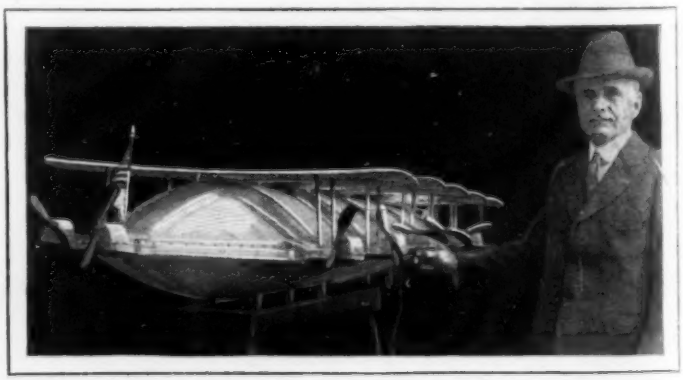
Sunlight in any room and at almost any time of the day as well as a changing view are possible in a "merry-go-round" house devised by French architects. It is constructed on a turntable like that used in railroad yards. A touch of a button starts it moving, and it may be stopped in the same manner. The buttons are placed in various parts of the house for convenience. The speed is dependent upon the size of the motors, but an automatic arrangement permits starting the house moving in the morning so that it will follow the sun all day without the need of pressing a button. A novel arrangement of rooms permits new schemes of interior decoration.

METEOR NEARLY STRIKES MAN ON NIGHT BICYCLE RIDE

Many meteors fall to the earth during a year, but there is apparently no record of one killing a person. One of the nearest approaches to such an accident was reported recently from England by a cyclist who declared that a meteor fell within seven yards of him while he was riding at night. He first heard a peculiar whistling noise, then saw a bluish-green light. The noise increased while what appeared to be a ball of fire, about the size of a coconut, fell in front of him. He dismounted and found that the road was covered with a peculiar ash at the spot. It stuck to his shoes and to the tires of the bicycle. Observers, on hearing the cyclist's story, expressed their belief that it could hardly be doubted, and several persons reported they also had heard the noise of the meteor.

COMBINE PLANE AND DIRIGIBLE FOR GREATER UTILITY

Trips across the Atlantic in sixty hours are visioned by a Los Angeles inventor who has devised a model dirigible of novel form, to suggest the means by which he hopes to realize his dream. The ship is essentially different from others in that it is flat instead of cigar-shaped and there are twelve propellers, five on each side and two in front. There is a running gear for land travel, and it is expected that the



Model of the Combination Plane and Dirigible Intended to Make Rapid Flights across the Ocean

ship could skim over or upon the water and sail entirely in the air. The envelope is to be filled with gas.

MORE MUSICIANS FOUND IN U. S. THAN LAWYERS

Full-time musicians, those dependent entirely upon music for a livelihood, greatly outnumber the clergymen or lawyers, in this country, a music house reports. Three times as many persons are earning their living with music as there are dentists or actors, and there are five times as many musicians as journalists. These figures do not include the many thousands who supplement their regular occupations by some form of musical endeavor. One of the signs of the developing interest in music is the increasing number of school bands and orchestras. Teaching formerly was confined largely to assembly singing, but now many schools have various musical organizations, and the value of musical education is recognized.

AUTO MATCH AND ASH HOLDER WON'T RUST OR RATTLE

Easily attached to any part of the automobile, a holder for matches and ashes can be manipulated with only one hand and does not tarnish, as it is finished in dark lacquer over solid brass. The ash chamber is deep so that the contents cannot blow out, and it is easily emptied.

Illustrating How the Radio Rescue Set Could Be Used in the Alps; Sending Outfit in Foreground

RADIO REPLACING ST. BERNARDS FOR RESCUE WORK IN ALPS

Travelers lost in one of the passes over the Swiss Alps can now signal distress by radio from sending units placed at several dangerous places on the mountain side. Guides, equipped with portable receiving sets, go to the rescue on short notice.

CHURCH SPIRE AS LIGHTHOUSE GUARDS ATLANTIC COAST

For many years, a light in the steeple of the First Baptist church in Beverly, Mass., has been a guide to mariners, and now, upon request of several sea captains, the government has taken over the spire and it is under the jurisdiction of the lighthouse service. Although it is several miles inland, the light is visible far out at sea.

Indoor Golf with Billiard Cues; Table Top as Eighteen-Hole Course with Numerous Hazards

GOLF GAME PLAYED ON TABLE WITH BILLIARD CUES

Indoor golf on a table, the top of which is spaced off to represent eighteen holes, is played with a heavy disk, about the size of a dollar, for a ball and ordinary billiard cues for clubs. Various obstructions are provided as hazards, and those who have played the game declare that it affords much of the thrill and enjoyment of the regular outdoor pastime.

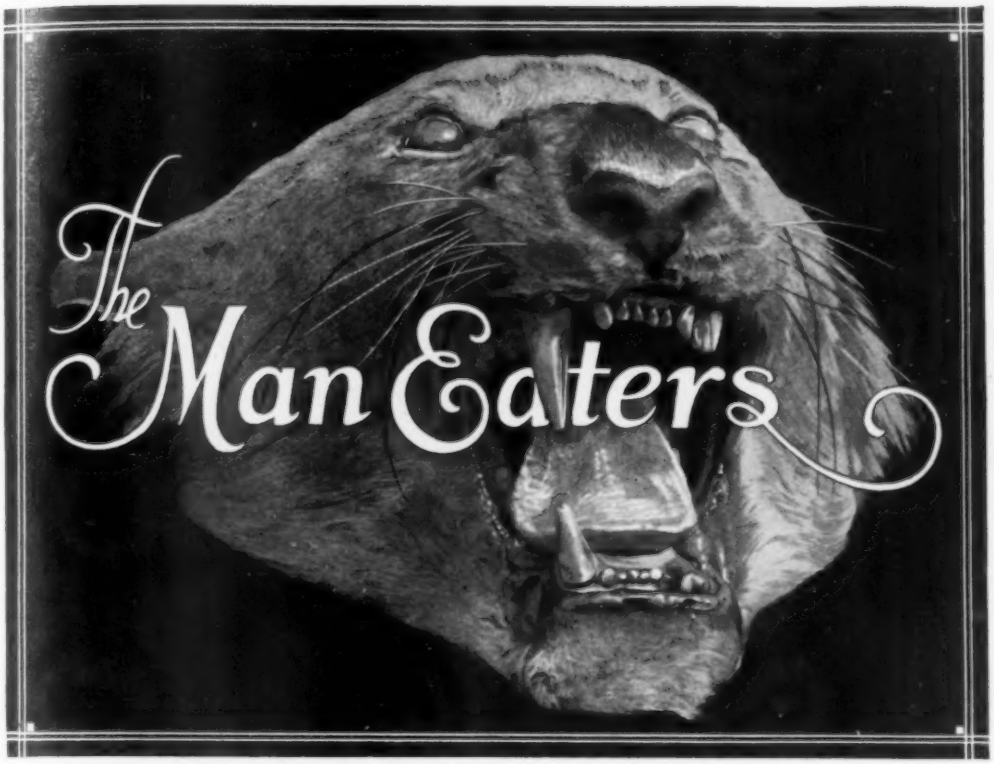
EDISON JOINS HUNT FOR RUBBER THAT CAN BE RAISED HERE

One of the most important studies the government ever has made, is the four years' search for a kind of rubber tree that can be grown in this country to give us our own supply and make us independent of foreign monopolies. To help in this hunt, there was enlisted recently the aid of America's greatest inventor, Thomas A. Edison, who is seeking a solution of the riddle, not by plant culture but by trying to devise a machine that will cheaply and efficiently extract the juices from rubber-producing plants that can be grown here. Various parts of Florida, Texas, New Mexico and other sections of the country yield a number of such plants, but advantage cannot be taken of the fact for the reason that the labor cost involved in preparing the raw substances would be so high as to make competition with cheap foreign labor impossible. Edison, therefore, seeks an apparatus that will take the task out of man's hands to a large extent, enabling a rubber man here, paying from $3.50 to $4 a day and more for labor, to compete with the grower in Africa, for instance, who pays thirty cents a day or less. He is working on the problem near Fort Myers, Fla., and is using the Madagascar rubber vine as raw material. This plant is known to grow well in Florida, but, so far, no practical way has been found for extracting its juice. Edison declared recently that he was "willing to work twenty-four hours a day," if necessary, to see the accomplishment of the great aim for American-grown rubber. In 1923, congress appropriated $500,000 for study of the problem.

Where Valuable Cyanite Deposits Have Been Found, Sample of Mineral Discovered in North Carolina

DISCOVERY OF CYANITE PROMISES BETTER SPARK PLUGS

Quantities of better spark plugs are expected as a result of the discovery of a huge deposit of cyanite, a silicate of aluminum, that can withstand repeated exposures to high temperature, in North Carolina. Investigators estimate that there are 100,000,000 tons of the material in a single mountain, and the specimens so far taken are of remarkable purity, some of them assaying ninety-five per cent.



The Man Eaters

By LIEUT. COL. J. H. PATTERSON, D. S. O.

WHILE life is counted cheap in the wilds with its savage beasts and strange peoples, yet Africa holds a lure of its own and is probably safer than our large cities because there the danger is realized and can be guarded against.

And, despite the hidden perils, how happy are the days on the sunny African uplands far from the crowds and noise, grind and gloom of modern civilization!

One day on the wide Athi plains, when I happened to be out all alone exploring that region, I saw a black object in the distance, and believing it to be an ostrich, stalked carefully toward it. On getting near, however, I found it to be a rhinoceros lying down, so I determined to try and take a photograph, but he jumped up and circled around until the wind gave him a clue of my whereabouts when, to my dismay, with the agility of a cat, he suddenly whipped around, snorted loudly and came for me straight as a dart. I only had a small-bore rifle and soft lead bullets with me and, of course, it was quite useless with this toy weapon to attempt to stop him. What was I to do? To run away would be of no avail for there was no shelter. To my frightened eyes the great beast looked like a mountain as he raced for me, and there was not a moment to be lost. I tore off my big sun hat and flung it from me, hoping he would see and rend it instead of me. I then dropped to my knees. Lower and lower I crouched until I lay full length in a little bit of grass, and with a quaking heart awaited my fate. Onward thundered the brute, and to my intense relief he charged between me and my hat without seeing either.

As soon as he had passed, I felt so happy that I could not resist the temptation of sending a couple of bullets after him to speed him on his way, but the soft bullets simply splintered against his thick hide, sending clouds of dust off his back. The bullets, however, tickled him up and apparently infuriated him, for he stopped short in his tracks, turned around, moved his great head right and left, tore up the ground with foot and horns and then—to my horror—repeated his tactics of trot-

Noted for Its Fierce Charge and Unexpected Agility, the Rhinoceros Is a Formidable Adversary

ting around in a circle until he again got my wind, when he once more, with snort of rage and tail erect, bore down upon me.

This time I feared there would be no escape and the dire predicament in which I now found myself was entirely due to my own folly. I felt the ground tremble as the great brute rushed toward me, and every moment I expected to be trampled to death or tossed on his formidable horns —but luck was with me again, and as I lay pressed flat into the grass, hardly daring to breathe, I was overjoyed to catch a glimpse of the enraged monster crashing by, and practically over me, not more than a couple of feet away. My relief may be imagined, and when I had summoned up enough courage to take a peep, the most charming sight I ever looked on in my life was the rhinoceros disappearing over a hillock.

After this adventure I left the plains and took to the Kikuyu hills, where I suddenly found myself surrounded by a horde of naked savages armed with spears and shields. Their bodies were smeared all over with white clay, and many artistic designs had been produced by removing the clay with a stick and leaving the skin to form a background. A little diplomacy and a present of "Amerikani" (cotton goods) got me out of their clutches and I went on my way rejoicing.

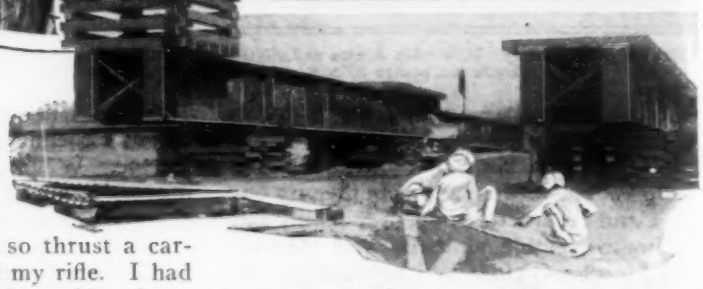
The Athi plains again called me, and here I had yet another narrow escape from death, this time from the king of beasts. I went lion hunting one morning on this vast expanse, accompanied by a friend who had shot tigers in India, but who had never yet encountered the African lion. On this occasion I rode Aladdin, a spirited Arab charger, and my friend, Spooner.

LIEUT. Col. Patterson, known as one of the greatest authorities on lion hunting, was sent to British East Africa in 1898 to help build a railroad through the jungle. He arrived as a civil engineer and departed world-famous as the killer of two man-eating lions that had devoured 135 of his workmen before they were slain. In all, he has killed twenty-eight lions. Col. Patterson served in the Boer war and was awarded the Queen's medal and made a Companion of the Distinguished Service Order. During the World war he was in command of the Zion mule corps in the Gallipoli campaign. He has traveled in many parts of the world.

Natives of the Kikuyu Hills with Spears and Shields and Bodies Smeared with Clay, to Form Designs; the Dark Marks Are Skin Areas from Which the Clay Has Been Removed

rode in a tonga, a two-wheeled cart drawn by a couple of ponies. We scoured the broad plains for hours without much success. When we were about to give up our quest and return to camp, I suddenly felt my horse tremble violently and then up out of the grass close by jumped a spotted hyæna. I looked after the ugly beast for a moment, but as Aladdin continued restive, I glanced over my left shoulder and saw two huge lions a few hundred yards off, sitting dog-fashion gazing intently at us. I shouted to Spooner, who was following me in the tonga, "Here's what we're after." I jumped off Aladdin and we advanced on the lions. "Now, Spooner," said I; "you take the one to the right and I'll take the one on the left. Fire when you're ready and take no notice of me."

The moment Spooner fired, I pressed my trigger and had the satisfaction of seeing my quarry rise and claw the air as he was hit. Both lions, instead of rushing at us, as I had expected, instantly turned and disappeared over the bank on which they had been sitting. I ran to Aladdin, leaped into the saddle and gave chase. After about a quarter of a mile of hard going, I began to overtake the fleeing beasts, and then, when they found I was catching up with them, they lay down and waited for me. When I had approached a little nearer, one of the lions made a vicious charge. I immediately turned around and made Aladdin show his best paces. The lion's charge only covered some sixty yards. He then lay down and waited. Presently Spooner arrived with the rifles and I said to him, "You shoot that lion"; so he knelt down, took careful aim and knocked the lion over stone-dead. The second lion watched us all the time, but never moved. He now growled viciously and swished his tail so vigorously that he raised quite a dust over his body. We advanced cautiously toward him. I was on the left a little in front, and on Spooner's right was his gunbearer, who carried a spare heavy rifle. The moment Spooner fired, the brute came for me. I fired, but apparently missed, and he was almost within one bound of me when he suddenly flashed past, and then I saw Bhoota, the gunbearer, running away. The next instant, the lion had seized the unfortunate man by the leg and had rolled him over as a greyhound would a hare. All this happened in an instant. I began to run up



Bunks in Trees Where Railroad Workers Slept to Avoid Lions, and "Fort" of Ties Built on Girder at Station during War on the Man-Eaters

to the lion and as I did so thrust a cartridge into the breech of my rifle. I had to face the lion's head and saw him chewing Bhoota's left arm. Spooner was actually trying to shove the lion off the unfortunate man so that he might get at the heavy rifle, which the poor fellow still clutched. The enraged brute never saw me until I put the muzzle of the rifle to his brain. Then I pressed the trigger and, horror of horrors, the rifle missed fire. The lion saw me and I felt that my last moment had come. He opened his jaws, and slowly threw himself on his haunches as if to spring. I remember saying to myself, "He'll never give me time to reload." I looked into his eyes steadily as I carefully and slowly moved one pace back. I moved two paces back, and then it suddenly struck me that in the hurry and excitement of the moment, I had forgotten to cock my rifle. To do so, and put a bullet into the lion's brain, was the work of an instant, and, as he was about to launch himself upon me, he fell dead on top of Bhoota. We rolled him off and hurried the unfortunate Shikari back to camp. We had to amputate his leg and, although he lived for about six weeks, the shock was too much and he died.

My life-and-death struggle with the man-eating lions of Tsavo was the last round in the long fight which has gone on all down the ages between man and beasts. I am convinced it is the last fight, because, owing to the advance of civilization, such happenings as I am about to set forth can never again occur.

Tsavo is situated some 130 miles from Mombasa on the East African coast. It is in the depths of a vast impenetrable jungle of thorn scrub, stunted trees and dense undergrowth. In this tangle, the man-eaters laughed at all our efforts to destroy them. We could not penetrate it save by slashing and hacking a path every yard of the way, while to the lions the jungle was as an open book.

I was engaged in this wilderness building a railway bridge over the Tsavo river when there appeared upon the scene the notorious man-eaters, whose record for sheer ferocity and absolute contempt of man surpasses anything hitherto known in lion history. They feared nothing—neither the roar of the rifle nor the blaze of the campfire. Traps, spring guns and firebrands they alike laughed at. They waged an intermittent warfare against our

Bhoota, Center, Sitting Up in Bed under the Shadow of the Skin of the Lion That Wounded Him; Spooner Is at Left and the Author at Right of the Picture

laborers and in the end succeeded in bringing the work to a complete standstill. In spite of all our precautions, man after man was taken from the midst of his sleeping comrades and devoured in the surrounding thickets.

My own first encounter took place near a vacated camp site which I felt sure the lions would visit. I had a wagon placed near the opening of the inclosure, and there, in the company of my friend, Dr. Brock, we sat in the open doorway and waited. When I now think of the foolhardiness of this procedure, it makes me shudder, but at that time we did not think of the danger we ran. We sat in the wagon for a couple of hours in perfect silence enveloped in darkness and then I heard a dry stick snap.

"The man-eater," I whispered to Brock.

A few minutes afterward there was a dull thud, as if some heavy body had jumped over the inclosure. Then we heard some cattle running about inside, and after that all became still. I proposed to my companion that I should climb out and lie on the ground so as to get a better shot at the brute if he should come in our direction with his prey, but Brock fortunately persuaded me to remain where I was, for at that very moment the man-eater was actually stalking us.

After a few minutes of intense peering into the darkness, I thought I saw something glide to a bush near our front. I asked Brock under my breath, "Did you see anything move?" but he made no reply, so I held my rifle in readiness and waited.

Those two or three moments I shall never forget. I felt instinctively that some uncanny deadly creature was stealing toward us, and I even thought I could discern a form of some kind, but I feared to fire lest it were only my imagination running away with me, and in that case I should merely frighten the man-eater away.

The darkness and silence could almost be felt, and for those few seconds the strain on my nerves was almost unbearable. Then—suddenly—a huge body sprang at us. "The lion!" I shouted, and both our shots rang out simultaneously. The noise and flash of our rifles so terrified the man-eater that, instead of leaping right into the wagon, he turned in his spring, but he got so close to us that I felt the swipe of his paw across my face.

We fired a few more shots in the darkness in order to prevent a second attack and then lit a lantern, and while I closed the door Brock stood ready to shoot. We had the luckiest escape that night that it is possible to experience. Only our keen vigilance and some good guardian angel saved one or both of us. Next morning we found Brock's bullet imbedded in the sand close to a footprint. It could not have missed the lion by more than an inch

or two. Mine had hit the lion in the mouth and smashed away two of his tusks.

A little later on, the man-eaters got bolder and, instead of attacking singly, as was usual, both lions entered the camp together and each seized a victim. I sat up night after night near likely places, but always in vain. Either the man-eater saw me and went elsewhere, or else I was unlucky, for as I sat watching over one camp, both brutes would attack another a quarter of a mile away, and I would have the mortification of hearing the agonized cries of the unfortunate men as they were being carried off.

This constant night watching was most dreary and fatiguing, but I felt that it was a duty that had to be undertaken, for the workers naturally looked to me for protection. I wish I could convey some idea of what it felt like to be perched in a tree all alone in that desolate wilderness on a dark night and to hear the deep roars of these dreadful monsters reverberating through the jungle and drawing gradually nearer and nearer. In the whole of my life, I have never experienced anything more nerve-shaking than to listen to these lions give forth their death challenge and to know that some one or other of us was doomed to an awful death before morning.

Once the lions reached the vicinity of the camps the roars completely ceased and we then knew that they were stalking for their prey. Shouts would pass from camp to camp "Khabar dar, bhaieon, Shaitan ata" (Beware, brothers, the devil is coming), but the warning cries would prove of no avail, and sooner or later, agonizing shrieks would break the silence, and another man would be missing from roll call next morning.

About this time I invited Mr. Whitehead, the district governor, who lived some thirty miles away, to come and assist me in my campaign against the man-eaters. He accepted and told me to expect him about dinner time. His train was due at six o'clock in the evening, so I sent my Indian servant up to the station to meet him. In a short time he came rushing back, trembling, in terror, and informed me that there was no sign of a train or of any of the railway staff, but that a big lion was walking up and down the platform. As Whitehead did not turn up, I went on with dinner, and heard a couple of shots fired, but as shooting was a common occurrence, I paid no attention.

Shortly after dusk I took my position in a crib made of sleepers perched on the end of a girder, and soon heard the man-eaters growling and purring, and crunching up bones about seventy yards away.

(Continued in the next issue)

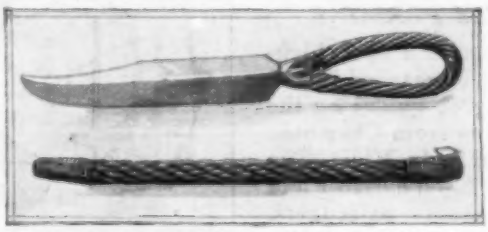
All Foodstuffs and Barter Goods Had to Be Carried for Hundreds of Miles on the Heads of Natives; Some Parts of Africa Have Not Yet Been Explored by White Men

WELL FORECASTS STORMS AND WEATHER CHANGES BY WHISTLING

In eastern Oregon is an interesting well that not only gives supplies of good water but acts as a sort of barometer to tell the approach of storms or changes in the weather. From twelve to twenty-four hours before a storm, it "exhales" a current of air. The draft increases as the storm approaches, sometimes reaching the intensity of a whistling, roaring jet and shooting up a mist of water with it. After the disturbance has passed, the well draws in air until an apparent equilibrium is established within and it is quiet until the next weather change. One theory explaining the phenomenon is that the shaft connects several pockets or chambers containing air of a temperature and pressure approximately constant. Air flows out or into the well, according to changes in the pressure at the surface. The long periods of activity are explained by the smallness of the opening through which the air must pass. The well is drilled to a depth of 458 feet through basalt and other older formations.

CUTLERY FROM OLD WIRE ROPE HAS KEEN EDGES

Discarded wire rope has been utilized by an Oregon blacksmith in fashioning various kinds of cutlery from hunting to carving knives. Plow-steel hoisting cable was used for the knife in the accompanying illustration. A short piece was flattened, welded, shaped and tempered for eight inches of its length. The remaining twelve inches were curved forward and welded to the hilt to form a handle. When ground and sharpened, the knife had an edge that rivaled that of a razor and held its keenness longer than the average kitchen carver.



Carving Set from Old Wire Cable; the Blade Keeps Sharp Edge as It Is Made of Plow Steel

Heater Lowered and Raised to Serve as Shelf; It Saves Space and Is Easily Installed

ELECTRIC HEATER FITS ON WALL AND SERVES AS SHELF

Double service is obtained from an electric heater intended especially for installation in the bathroom, doctor's office, nursery or similar place. It is made of porcelain-enameled steel and either is hung against the wall or may be swung up at right angles, as a convenient rack for heating flannels and clothing, keeping medicines warm, or for drying towels and other articles when the current is on. A switch gives three stages of heat.

BELLS HUNG ON RATS' NECKS TO DRIVE PESTS AWAY

Officials in charge of a postal substation in Dallas, Tex., adopted a scheme of belling rats to drive the rodents out. Four of the animals were caught with traps, and small bells were placed on their necks. They were then released and apparently spread dismay among the others, for the station basement and rooms were quickly rid of the pests.

Where Cactus Grows to Tremendous Heights; Ladders Are Needed in Examining California Specimen

GIANT CACTUS AFFORDS HOME FOR SCREECH OWLS

Examination of species of giant cactus, in Lower California, required the aid of a ladder, as some of them grew to such a great height that the tops could not be reached without climbing. Screech-owl homes were found in some of the holes that woodpeckers had made in the cactus.

BIG ELEVATOR UP MONT BLANC TO CARRY FIFTY PERSONS

The top of Mont Blanc, Europe's highest mountain, will soon be reached in two hours without climbing or guides by the completion of a cableway from Chamonix to the summit of Aiguille du Midi. The installation is like a big hotel elevator and carries from fifty to seventy passengers. Construction was begun seventeen years ago but was delayed by the war. The trip to Aiguille du Midi takes one hour and the remaining two-thirds of a mile to the top of Mont Blanc is easily covered in another hour by a new comfortable road.

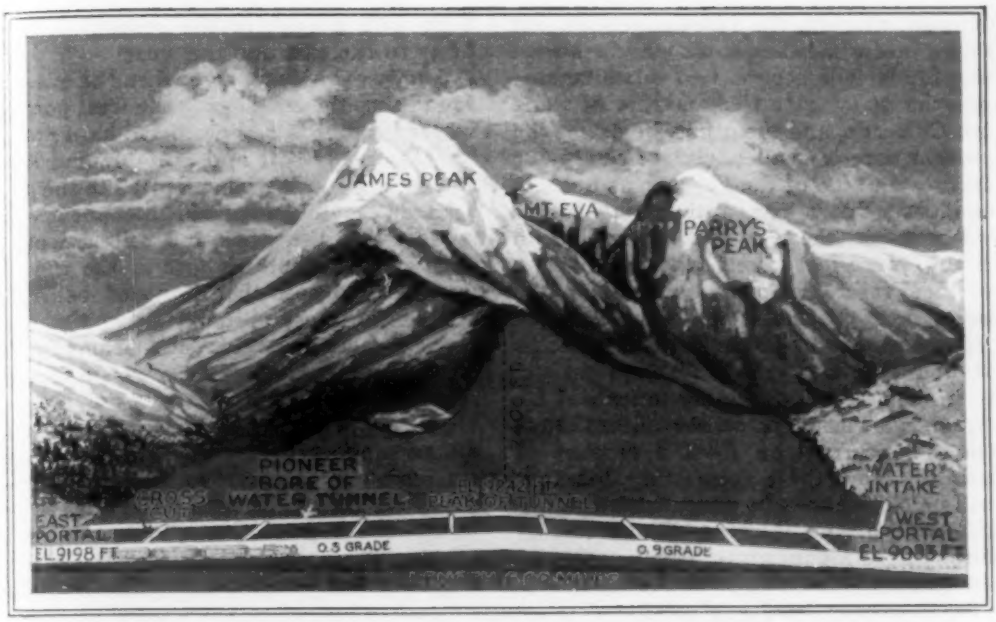
FIFTY-THOUSAND-YEAR-OLD LOG FOUND IN DIGGING WELL

Pieces of a tree believed to have been buried at least 50,000 years ago were brought up from a depth of 754 feet while digging a well in Tacoma, Wash., recently. The wood was well preserved and the bark readily distinguishable from the rest of the trunk. While the species was not determined, it apparently was some kind of conifer. The discovery indicates that the area was timbered before the glacial age, as the strata in which the tree was found are believed to have been deposited before the last ice period in that part of the country. The glaciers and river deposits had covered the trunk, and as it was almost completely immersed in water, it had not suffered any decay.

SEAT FOR INFANT FITS ON CHAIR IN AUTO OR SWING

Fitted with a tray, a secure back and sides, a seat for infants is hooked to an ordinary chair or may be used in the auto or suspended by cords as a swing. The bottom can be thrown back and the seat used as the toilet. The hook is rubber-covered to afford a firm grip and prevent damage to the furniture.

Infant's Seat and a Few of the Typical Uses to Which It May Be Adjusted



Sectional Diagram of the Moffat Tunnel and Its Companion Water Bore; the Saddle above It Is Rollins Pass, through Which the Railroad Has Made Its Way for Many Years

How Rail Builder's Dream Came True

Moffat's Tunnel Cuts Coast-to-Coast Lines Seventy Miles and Opens Vast New Empire for Cities and Farms in West

TWENTY-FIVE years ago, a sixty-five-year-old pioneer of Denver dreamed a dream in which the Colorado metropolis became a stopping place of a through continental railroad; in which the vast and potentially valuable western section of Colorado was opened to settlers with an assurance of direct transportation to the markets for their produce, and in which the backbone of the Rockies was to be pierced by the greatest railroad tunnel in America, to make the dream come true.

He labored for nine years, sunk his own great fortune and the fortunes of many of his friends, and when David H. Moffat finally died, the tunnel had not even been started and only 214 miles—about one-third—of his proposed railroad to Salt Lake City was completed.

It took another sixteen years to see the Continental Divide blasted through with a six and nine-tenths mile tunnel, but finally it has been opened and the Moffat tunnel is in operation as a permanent memorial to the visionary who conceived it. As a result, a new combination of railroads is in prospect to create a transcontinental system that will be seventy miles shorter than any existing route, and, when a connecting link is built, Salt Lake City will be brought nearer by 173 miles to Denver.

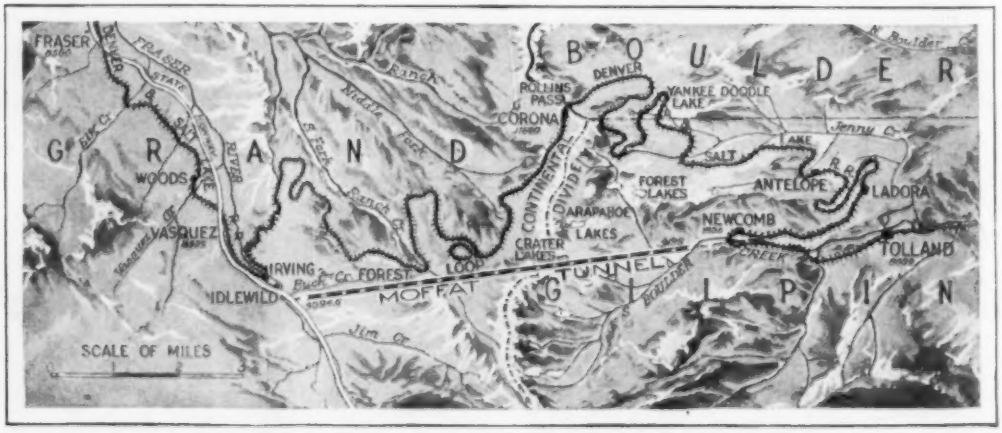
When the traveler rides at ease through the long bore, he will pass 2,400 feet below Rollins pass, through which the railroad, after a tortuous climb, has wound its way all these years since Moffat saw the first rails laid. For a time, the bore will hold the title of the longest railroad tunnel in America, though the Cascade tunnel, now being built by the Great Northern, is soon, with its seven and a half miles of length, to take that honor away.

In one way, however, it will remain unique—the only railroad tunnel ever built by a city, for it was the money of Denver, aided by surrounding counties, which made the tunnel possible. Eventually the city and counties will get it all back, with

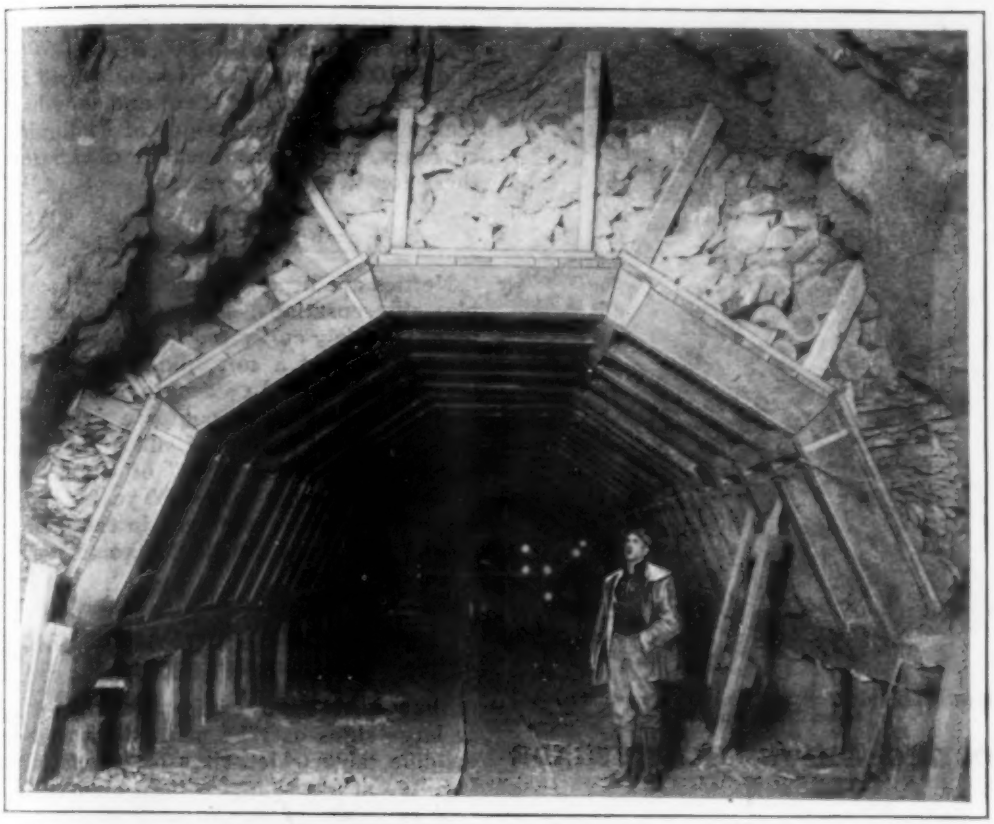
interest, through the railroad rentals, but in the meantime the people who furnished the funds will secure two advantages—one the opening to their market of western Colorado, and the other the use of the pioneer bore, a smaller tunnel seventy-five feet to one side of the big one, as a water conduit. Years ago, anticipating future water needs, the city of Denver filed on 100,000 acre-feet along the headwaters of the Fraser and other streams, on the west side of the Continental Divide. When it came time to build the railroad tunnel, a smaller bore was rushed through parallel to it, with short connecting tunnels at intervals, so that work on the railroad tube could be carried on from a number of points. Now these connecting passages will be closed and the water from the Pacific side of the Rockies will be carried through the mountain to be consumed on the eastern slope.

With unparalleled engineering difficulties to face, the pioneer bore enabled the builders to complete the work in the allotted span of forty-six months. The cost, estimated at $6,720,000, has been nearly doubled because of the difficulties encountered, and to solve them, the engineers have had to create their own machinery. One trouble arose when Crater lake, a pretty little mountain pool lying in a valley nearly a thousand feet above the bore, began to drop its entire contents into the shaft. Huge pumps worked for months to carry away the flood and keep it down to the point where men could work. To facilitate drainage, the tunnel has been built with a peak in the center, sloping away to the east and the west.

Another problem arose when the miners found that the rock inside the west portal, where geologists had predicted hard granite, was really soft and crumbly and dissolved into muck when exposed to the air. It made easy digging, it is true, but it was so soft that the walls and ceiling would slide into the hole as fast as the tunnel was dug, so soft that it oozed between all but the most perfectly fitted timbers. Huge twelve-by-twelve-inch beams were crushed under the immense weight into a mass of match sticks. It was only possible to dig when the roof was supported, and to support it the engineers devised an entirely new machine in tunnel work—the traveling cantilever needle bar. The needle bar was really two immense steel girders, three and a half feet thick and sixty-five feet long, tied together by rigid struts and braces and supported on enormous foot-square stringers of Oregon fir. Resting on the "bench" at the tunnel heading, and with a third of their length projecting to the rear, the girders carried the supporting timbers that held up the roof while the muck was carried away and permanent timbering put in place. All big tunnels are dug with a bench at the heading where the men work, because their size makes it impossible to work from floor to ceiling without scaffolding. To get around the difficulty, the miners blast out the top half first, and leave the lower half, or the bench, which is removed, always a day behind, the heading being twenty to



Map Showing How the Moffat Tunnel Pierces the Divide and Cuts Off Many Miles of Tortuous Curves and Steep Grades on the Railroad Route from Denver to the West Coast



West Portal, with the Final Wooden-Segment Arches in Place and the Space Above Packed with Dry Cordwood, Used to Hold Back the Enormous Weight of the Crumbling Rock

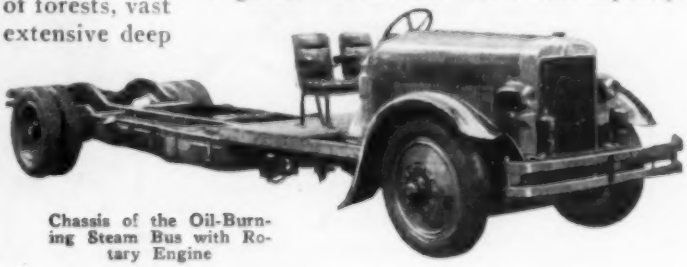
thirty feet ahead of it, depending on the nature of the rock.

The needle bars also carried between them an endless-belt conveyor to remove the muck from the face to the waiting cars, while specially designed electric shovels, built to work in close quarters, scooped up the muck of the bench as it was blasted free and eliminated the usual gangs of "muckers."

The new territory in northern Colorado which is now being opened to intensive development includes 15,000 square miles of coal lands, 11,000,000 acres of forests, vast beds of oil shales, and an extensive deep oil pool which has been opened within the last two years near Craig, the present terminus of the Moffat road. Building stone, marble quarries, cement, valuable clays, metals of various kinds and radium-bearing earth, as well as fertile valleys are also among the resources.

STEAM BUS RUNS SMOOTHLY AND BURNS OIL

Elimination of unpleasant fumes as well as the noise and vibration attending the operation of a gasoline motor, is one of the desirable features attributed to a steam bus with a rotary engine. It burns fuel oil or kerosene, one gallon of which is said to give as much mileage as a gallon of gasoline in a motor bus of like capacity.



Chassis of the Oil-Burning Steam Bus with Rotary Engine

Another Use for Ostrich Plumes; Fashioned into Decorative Floor-Lamp Shade

OSTRICH-FEATHER LAMP SHADE LATEST NOVELTY

Uncurled ostrich feathers of an orange hue have been found effective in making floor-lamp shades, to harmonize with certain schemes of interior decorating. They shield the eyes from the direct rays, diffuse a pleasant glow and can be made in much less time than is required for those of silk or other fabric.

PAPER MONEY TO BE SMALLER FOR LONGER WEAR

Easier to count and handle, the smaller sizes of paper money proposed for circulation in the near future will save the government about $4,000,000 a year, and as the bills will not have to be folded so many times, it is expected they will last longer. They will be "greenbacks," much harder to counterfeit than the yellow notes, as they will be printed in dull green and brown colors that defy accurate reproduction under a camera. At present, there are five kinds of $10 bills. In the new series, there will be but one of this denomination and of all others, a distinctive design being chosen for each. It is planned to drop the $2, $500, $1,000, $5,000 and $10,000 issues. The new ones will be six inches long and two and one-half inches wide, the dimensions of Philippine currency, which has been in circulation there for twenty-five years.

DRESSING IN GRASS

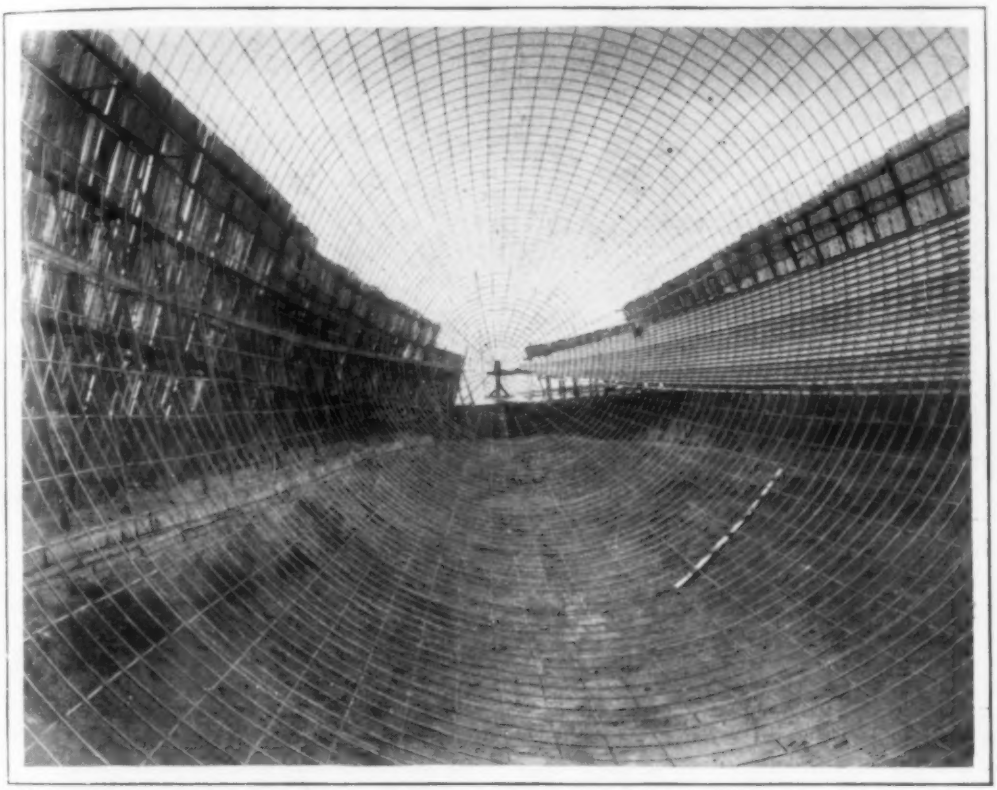
Nettles are usually associated with unpleasant sensations, but a species of the plant is widely cultivated in China for the manufacture of a soft silklike fabric for textile purposes. In strength, beauty and texture it is said to compare favorably with the finest grades of silk and is less costly. The "grass cloth" of China has been used for more than 4,000 years. Pineapple fiber is also employed in the manufacture of fabric for handkerchiefs and other articles.

EXTENSION DRAFTING TABLE FOR BIG SIGNS

Show cards but a few feet square as well as large signs may be painted on an adjustable table which rises or lowers, tips to different angles and is light enough for easy carrying. It may be made as small as two by four feet, as high as seven feet and of almost indefinite length, depending upon the number of units employed. The parts are held together by bolts and screws which are quickly inserted or taken out.

Table as It Appears When Closed; for Larger Signs It May Be "Stretched" Out to Great Length

AIR LINER BUILDING FOR TRIPS ACROSS CONTINENT



Framework of the Dirigible under Construction; Duralumin Is the Main Material and the Ship Is to Employ a "Vacuum" Principle of Propulsion Instead of the Usual Propellers

Round trips between the Pacific and Atlantic coasts can be made in three days with a new type of dirigible, its inventor believes. In construction, it is much like other ships of its kind, the chief difference lying in the method of propulsion. Instead of boring through the air, it is equipped with a blower which is said to take most of the air from the nose of the dirigible, creating a partial vacuum. The air is then discharged at right angles to the surface of the ship at high velocity, thus on account of the shape of the envelope providing a propulsive force. The craft is to be 400 feet long and somewhat lighter than existing dirigibles of its size. Steam turbines will be used for motive power and it is believed the load-carrying capacity will make long trips practical.

AUTO WINDSHIELD KEPT CLEAR WITH CHEMICAL WIPER

Easily attached to any windshield wiper, automatic or hand-operated, a special blade spreads a chemical which is said to clear the glass of moisture and keep it so for several hours without the necessity of constant repetition. The blade can be put on with a screwdriver and has two layers, one of rubber to scrape off the dirt and a felt section which serves to distribute the chemical.

Chemical Blade for the Windshield Wiper, and Drawing Illustrating Its Efficiency

Rum-Chaser Airplane Equipped with Lewis Machine Gun; the Craft Can Travel through the Air or on Water

SIX RUM-CHASING AIRPLANES HAVE MACHINE GUNS

Airplanes equipped with Lewis machine guns have been added to the regular rum-chasing fleet to prevent smuggling. They can travel in air or on water.

NAVY TO BURY ITS EXPLOSIVES TO AVOID DANGER

Artificial caves, built into the sides of hills, will be used in the future by the navy department for the storage of ammunition as one means of preventing another disaster like that which wiped out the Lake Denmark depot last year. The caves will embody all the lessons learned in past explosions, and when the system is installed, ordnance experts believe that it will be impossible for a fire starting in one building to communicate the explosion to others. The first ammunition depot of the new type is to be installed at Yorktown, Va. Each building will be constructed in a recess dug in a hillside, with the earth banked against three side walls, leaving only the front open, and it will be covered by an earth barricade a few feet in front of it. All steel used in construction will be joined together to prevent sparks jumping from one piece to another if struck by lightning.

QUICK REPLANTING SAVES UPROOTED SHADE TREES

Many beautiful shade trees, uprooted each year by storms, are cut up and carted away when they might be replanted and saved if given fairly prompt attention. After the hurricane in Cuba last fall, trees were "salvaged" in this manner and, within a month, had sprouted new leaves and were prospering. It is thought that all traces of the wind's damage will have disappeared within a few years. The tree is trimmed back and braced with props, in many instances, to support it while the new roots are forming, and it is often necessary to supply fresh earth. Crews with derricks and other hoisting apparatus can handle large trees with comparative ease.

Large Tree, Partly Uprooted by Hurricane in Cuba, Was Saved by Quick Replanting and Trimming

ELECTRIC QUESTIONNAIRE SPEEDS PUPILS' STUDY

Pupils Taking Test by the "Electric Questionnaire"; a Buzzer Is Sounded to Announce When the Time Allowed for Answering Each Question Is Up

Alertness and quickness in answering questions are said to be developed in pupils through the use of an electric buzzer and special sets of test questions and answers, covering a variety of subjects. After a question is announced, a reasonable time is allowed for writing the answer, then the teacher plugs in the buzzer, which signals that the time limit is up. Papers are exchanged and the pupils correct each other's, according to the answers.

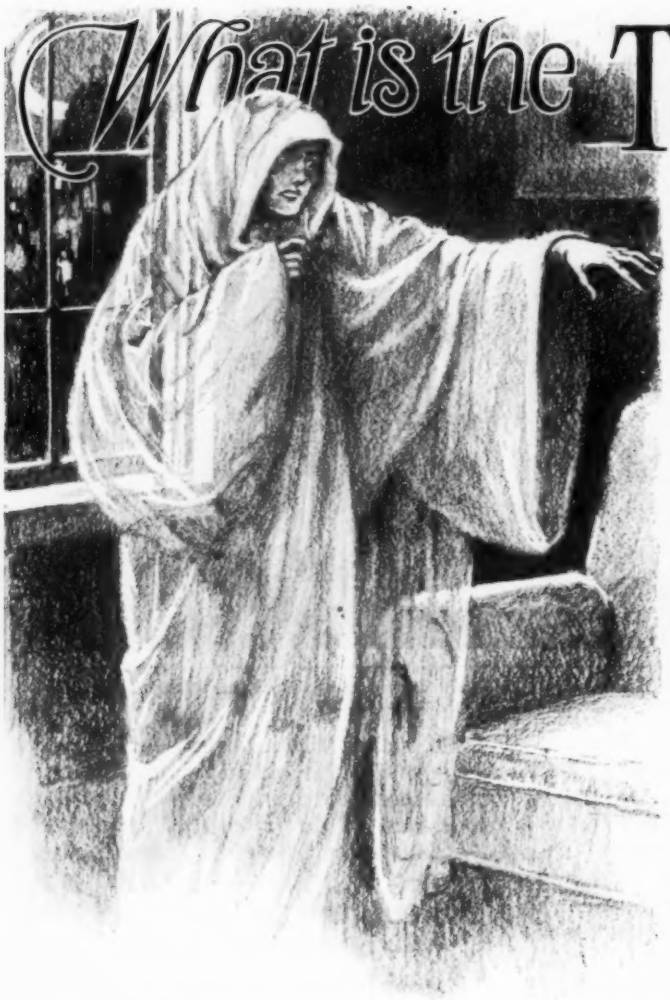
USE ICE TO LOWER CONCRETE FOR BANDSTAND FLOOR

Sunshine and ice were utilized by engineers in Florida in lowering a sixteen-ton concrete slab which forms the floor of a bandstand at a municipal pier. Screw jacks could not be used, as it would have been impossible to remove them after the concrete was in place, and the difficulty was further increased by the fact that the work had to be done in an exceedingly narrow space. The floor was to be lowered eighteen inches. It was first elevated two feet, then thirty-two fifty-pound cakes of ice were fitted under it as supports. The jacks were then removed and while sunshine melted the ice, engineers removed the two-foot props and substituted six-inch blocks. Men with long-handled mops took care of the water that formed, and the job was completed in sixteen hours.

TRAPDOOR ASH TRAY IS CLEAN AND HAS LARGE CAPACITY

Ashes are kept from blowing about and unpleasant odors are eliminated in a large bowl that has a spring trap for stubs and ashes. Pressure on a knob at the top swings a little door which sweeps the cigar or cigaret leavings from a smaller recess into the large container below, where they are securely held for later removal. The bowl or main ash receptacle is large enough to make daily emptying unnecessary. The tray also is provided with a bracket for a match box and supports for cigars.

What is the TRUTH



GHOST stories are being bought and sold in the London real-estate market as a result of the discovery that old castles with spooky reputations are preferred by buyers, particularly wealthy Americans. Not that the purchasers believe in ghosts, but there is something about owning a home with a tradition of being haunted that makes it worth thousands more, in the estimation of many purchasers.

England is well supplied with good ghost stories, and the list is constantly being added to, largely, it is believed, because candles are still extensively used for illumination and the dim light of a candle is very favorable, according to scientists, for producing the condition that leads to seeing things that aren't there.

Ghosts have always had one drawback from the standpoint of careful investigation—they are usually seen by people who don't want to see them, and almost never by persons who go looking for them. There is a simple explanation for that, and for the ghosts that are heard as well as those that are seen. The visible ghosts, scientific investigators declare, exist only in the eye of the beholder, and the audible ones in his ear.

Everybody, even those who have never claimed to have seen a ghost, has lain awake at night and heard queer sounds, abnormally loud, even though they would have been inaudible to anyone else, because they existed only in the hearer's own ear. The sounds were made by blood pulsing through the veins of the ear. Picked up by the eardrum, which amplifies them just as a radio receiver amplifies an incoming signal, the ear sounds, heard in moments of apprehension or nervousness, can easily be imagined to be the stealthy steps of a burglar or the movements of a more ghostly visitor, particularly if one is sleeping in a centuries-old castle well supplied with ghostly legends.

As for the ghosts that are seen, they are classified medically as Purkinje images or Sanson specters, both named after their discoverers, and it is in seeing them that the weak light from a candle plays such an important part. Purkinje discovered that under certain conditions the blood vessels

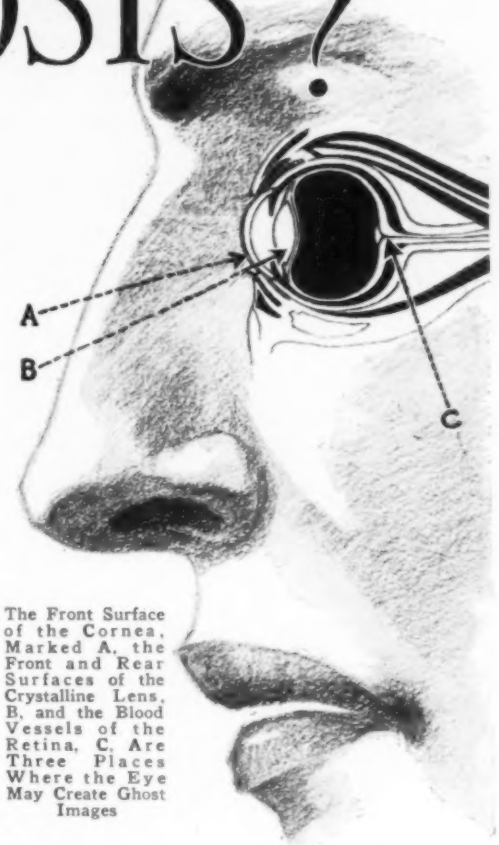
about GHOSTS?

in the retina, that film at the back of the eye which is directly connected with the nerve leading to the brain and which really sees the image focused on it by the eye lens, could produce images of its own. To do that, though, a dim light is necessary, as a bright illumination furnishes so much light that the blood vessels do not cast their shadowy reflections. It is as when one meets an approaching automobile at night. If the car has bright lights on, that flood of light blinds the eye, whereas if the dimmers are turned on, the retina is able to distinguish all the details of the roadway clearly.

Like the Purkinje image, the Sanson specter is produced within the eye, either on the front surface of the cornea, which is at the front of the eyeball, or on either the front or back surfaces of the crystalline lens, a convex lens like that in a camera, which focuses the image on the retina. When you look through a street-car window under certain light conditions, you not only see the passing buildings outside, but likewise images of the people behind you, or buildings on the opposite side of the street, the images being formed on the window glass. The Sanson specters are something of the same sort, tiny images, usually badly blurred, of things which are at one side, out of the direct line of vision. But the optical nerves, accustomed to placing things they see by their size and relation to other objects, transmit a message to the brain saying that these blurred specters are ahead, and, like the images on the street-car window, you can look right through them and see solid objects behind.

Given a dim candle flame and a condition of nervousness, grief, or even indigestion, it isn't hard to imagine that you are seeing images of ghostly figures, particularly as they appear to be almost transparent, and move and shift position as you move.

"We know now," says Dr. Frederick Graves, an English scientist, "that ghosts



The Front Surface of the Cornea, Marked A, the Front and Rear Surfaces of the Crystalline Lens, B, and the Blood Vessels of the Retina, C, Are Three Places Where the Eye May Create Ghost Images

are mostly figments of the subconscious mind that gives us dreams. Certain abnormal states, as when toxic matters linger in the system, produce visions readily; even from errors of diet, a person may have startling revelations.

"That unconscious element that slumbers not and, when unfettered by the will of the conscious mind, can act by itself, as in hypnotism, somnambulism, automatic walking and writing, accounts for many queer things. Those myriad cells on the verge of the gray matter of the cerebrum are always storing impressions, and now and then throw the surplus out, often jumbled together and wildly distorted, as in a nightmare. There are two sides to the brain, and there have been many Jekylls and Hydes in real life."

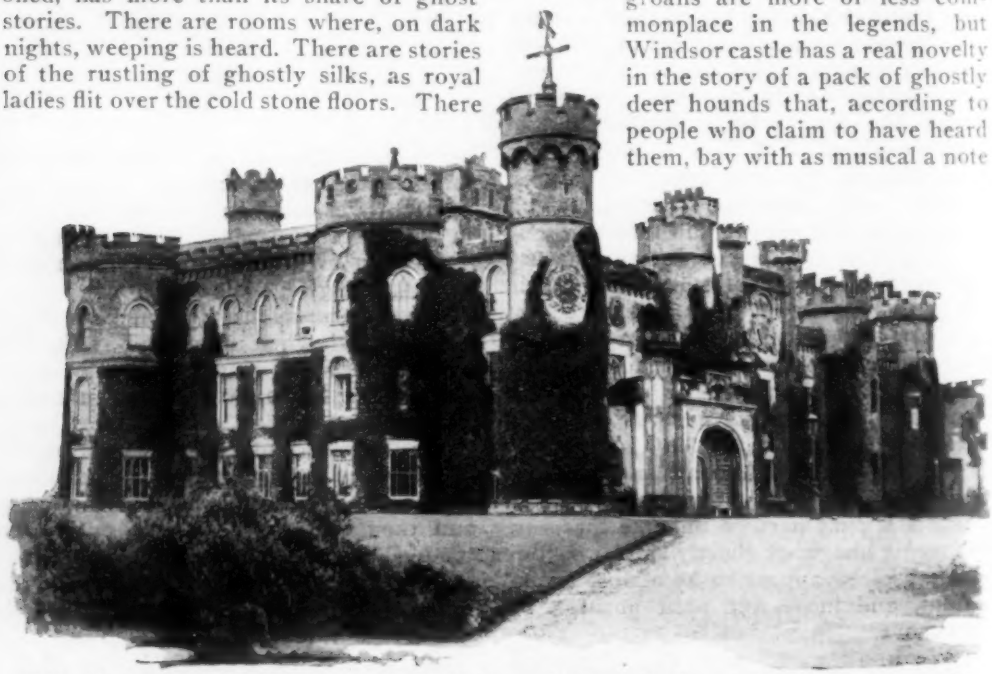
But despite the scientific laying of the whole ghost story, specters remain pop-

ular, may be because, as science has discovered, even a "creepy" feeling can be highly agreeable. To satisfy that desire, the Martin part of the Tower of London was recently opened to the public, largely because it has a satisfactory ghost story connected with a one-time keeper of the crown jewels, who made his home there. On a Sunday night in October, the keeper of the jewels and his wife were seated at supper when a pale figure, like a glass tube filled with a dense white and blue fluid, emerged from the wall, floated across the room and started to seize the frightened woman, when her husband heaved his chair at it, and the ghost promptly disappeared. A short time later a sentry at the tower door saw a gray, shapeless thing approaching, challenged, and then lunged with his bayonet, following which he fainted and was found unconscious by the officer of the guard. He escaped court-martial for sleeping at his post when an officer in a near-by room reported hearing the challenge.

So the government opened the tower to visiting Americans looking for ghosts. The old Tower of London, where kings and queens and lesser folk were imprisoned, has more than its share of ghost stories. There are rooms where, on dark nights, weeping is heard. There are stories of the rustling of ghostly silks, as royal ladies flit over the cold stone floors. There is a tale of an officer of the guard who climbed a ladder to peer through the window of an empty Norman chapel to investigate a ghostly light and saw a sight so terrible he never told what it was. That last is a not uncommon added touch to a number of ghost stories.

While the ordinary ghost stories—victims of bold bad barons and the dangerous dukes of the Middle Ages—are being quoted in the real-estate market at thousands each, there is one specter in England that probably would be worth a million if his home should be placed on sale. He is the royal ghost of Buckingham palace, the town castle of the king and queen in London. According to legend, the spirit of the mad king, George III, haunts the corridors of Buckingham of nights. Up and down the red-plush-draped corridor at one end of the royal home, in and out among the gilded chairs, the ghostly king is said to pace, pausing before the long windows to look out at the dancing shadows of the trees, a spectacle that always fascinated him in his lifetime.

Ghosts of men and women who appear and disappear silently or pause to rattle ghostly chains and exhale tremendous groans are more or less commonplace in the legends, but Windsor castle has a real novelty in the story of a pack of ghostly deer hounds that, according to people who claim to have heard them, bay with as musical a note



Eridge Castle, Home of Lord Henry Neville, Which Boasts the Ghost of a Young Girl Who Pined Away after Being Imprisoned in the Main Turret by a Bold Bad Baron of the Middle Ages

Hurstmonceaux Castle, Deserted, Boarded Up and Headed for Ruin, But with Its Legends of Ghostly Inhabitants in the Long Echoing Corridors Still Keeping Vandals Away

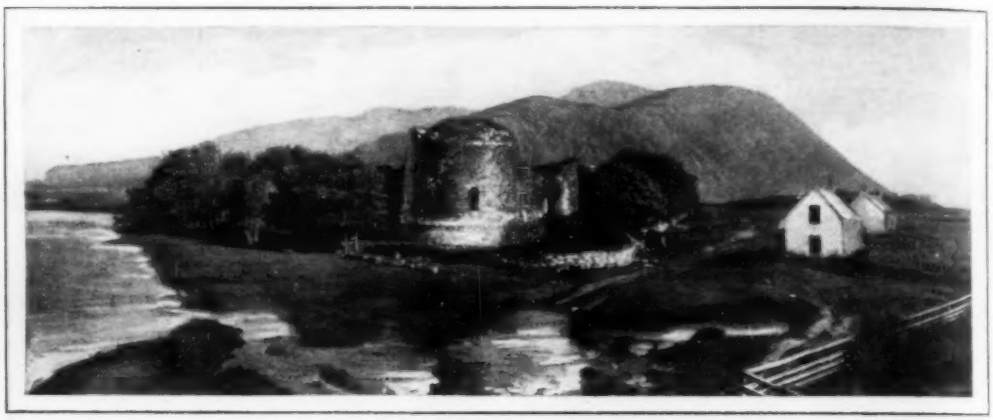
as they ever uttered in real life. To make the thing complete, the spectral hounds, instead of chasing the live deer in the great Windsor forest park, have ghostly prey, too, and are guided by a ghostly hunter. The legends say that a royal huntsman named Herne, dismissed from his post, hanged himself in an oak that was afterward known as Herne's oak. Then by mistake, the mad king, George III, he whose restless spirit is said to walk Buckingham palace halls at night, ordered the oak cut down in 1793, whereupon Herne the Hunter came back to haunt the palace and brought his hounds along.

As recently as last October, the specter pack was reported chasing the ghostly deer across the park. The wife of a farmer, living at the edge of the royal preserves, heard the old clock at Windsor strike midnight—the favorite moment for all ghost stories—and then heard the baying of the distant hounds hot on the ghostly scent of their non-existent quarry. And, relates the farmer's wife, "exactly two weeks later, again at midnight, I heard the same thing. My daughter knocked at the door and asked, 'do you hear them?' Not having spoken to her of my first experience I said, 'hear what?' 'They must have been Herne the Hunter's hounds,' she replied."

Waldorf Astor, one-time American but now English, recently acquired the ghost legend of no less a person than Anne Boleyn, wife of Henry VIII, when he bought romantic Hever castle, in Kent. Under the frowning walls of the old stone pile flows the river Eden, spanned by a bridge across which, at each Christmastide, glides the alleged ghost of the lady who lost her head in the Tower of London. Hampton court, built by Cardinal Wolsey, is reported to be haunted by two queens and a prince of the church in the ghostly persons of Queen Jane Seymour and Queen Catherine Howard, two more of the eighth Henry's wives, and the cardinal himself, who died after being stripped of his power by his king.

For several years, according to the Hampton court legends, a spinning wheel was heard at night though no wheel could be found. The noise seemed to come from behind a dead wall; so, recently it was broken through, and there was the wheel, covered with the dust of several centuries. An old plan of the castle showed this had once been the private apartment of unfortunate Queen Jane.

Two women, both royal pensioners living in the castle, claimed they met Queen Catherine one night standing by the great staircase wringing her hands and sobbing



Ruins of an Ancient Scottish Keep on Wild Loch Aber, Still Said to Be Frequented by the Spirit of a Pictish Warrior Who Was Killed There in Battle Nearly 2,000 Years Ago

piteously, and her screams, they say, are often heard. Search of history discloses that the queen was sitting near the stairway some 400 years ago when she heard the king had decreed her death. She attempted to rush to his presence, but was dragged back, screaming, by the men of the royal guard.

ALMOST TOTALLY DEAF HEAR WITH SOUND AMPLIFIER

Persons with but twelve per cent of the normal capacity for hearing are said to distinguish sounds through an amplifying apparatus recently demonstrated in New York city. It is intended for permanent installation, not as a portable outfit, and picks up noises in any part of a room with such great amplification that an almost totally deaf person can hear them. The equipment is provided with vacuum tubes, ear phones, microphone and other radio devices. It is designed especially for use in the home or office.

Aid for the Extremely Hard of Hearing; the Amplifying Cabinet and Attachments

HUMAN HAIR OPERATES FOG GUN IN LIGHTHOUSE TOWER

How a slender ribbon of human hair has been adjusted to fire a fog gun whenever the mists endanger shipping, is one of the romances of engineering. This installation is found in the Antioch lighthouse tower on the southeast coast of France. Hair absorbs moisture and, under tension, will lengthen slightly when the atmosphere has a high degree of humidity. This is the principle which has been harnessed for saving of human lives. When fogs arise, the hair ribbon, about eight inches long and composed of 100 individual hairs, stretches sufficiently to close an electric circuit which, in turn, fires the gun at the rate of two flashes a minute. The explosions are made by igniting a mixture of acetylene gas and air. Sufficient "ammunition" is provided for 300 hours of continuous firing. Building the tower

was an engineering accomplishment in itself. Its foundation reaches six and one-fourth feet below the low-water line and the work could be carried on only a few hours each day; in all, forty or fifty times during the months from July to October when shallow boats could reach the site. The fog gun fired by the "hair trigger" was installed last fall and has worked satisfactorily since.

GROWING FROGS FOR FOOD

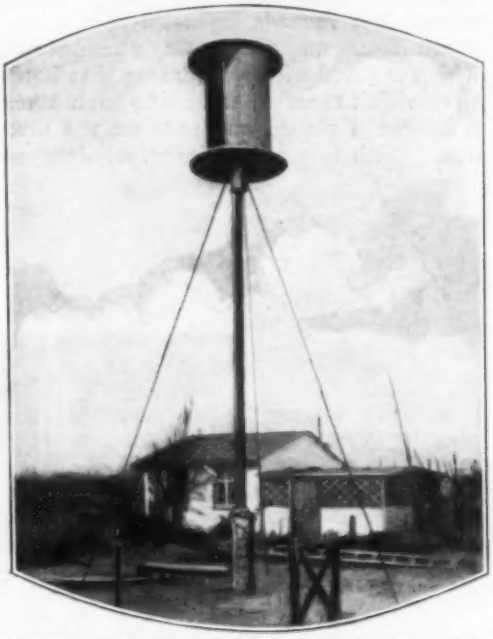
Bullfrogs at $48 a pair and tadpoles forty-eight cents each—such prices are reported common in Japan where frog raising recently has become a popular industry since the legs have been in demand for food. Frogs have been purchased in large quantities from the United States and, since 1922, the imperial university of Tokyo has been working in co-operation with bodies here to promote frog culture. The common bullfrog is the one popularized as food. It grows to about eight inches in size, has the power to change color and spends two winters as a tadpole, reaching its full growth at seven years.

AUTO-TRUCK TANK FOR TROUT SAVES HANDLING CANS

Transporting live trout from the hatchery to the streams has been simplified by an Idaho man by means of a special tank on a one-ton motor truck. It will carry as many fish as could be contained in sixty cans, saves bothering with the separate containers and is emptied directly into the stream simply by pouring the contents through an extension at the rear. The tank has an aerator for emergency use, two ice hoppers, each containing 100 pounds, and holds 250 gallons of water. Fish have been delivered in it as far as 300 miles in a single day's drive and were in as good condition when they entered the stream as when taken from the hatchery.

Discharging the Live Trout Directly from Auto-Truck Tank; No Cans Need Be Handled

ROTOR IS HARNESSED TO PUMP AS WINDMILL SUBSTITUTE



Rotor Windmill Rigged to Pump, near Berlin, as Substitute for the Ordinary Wheel

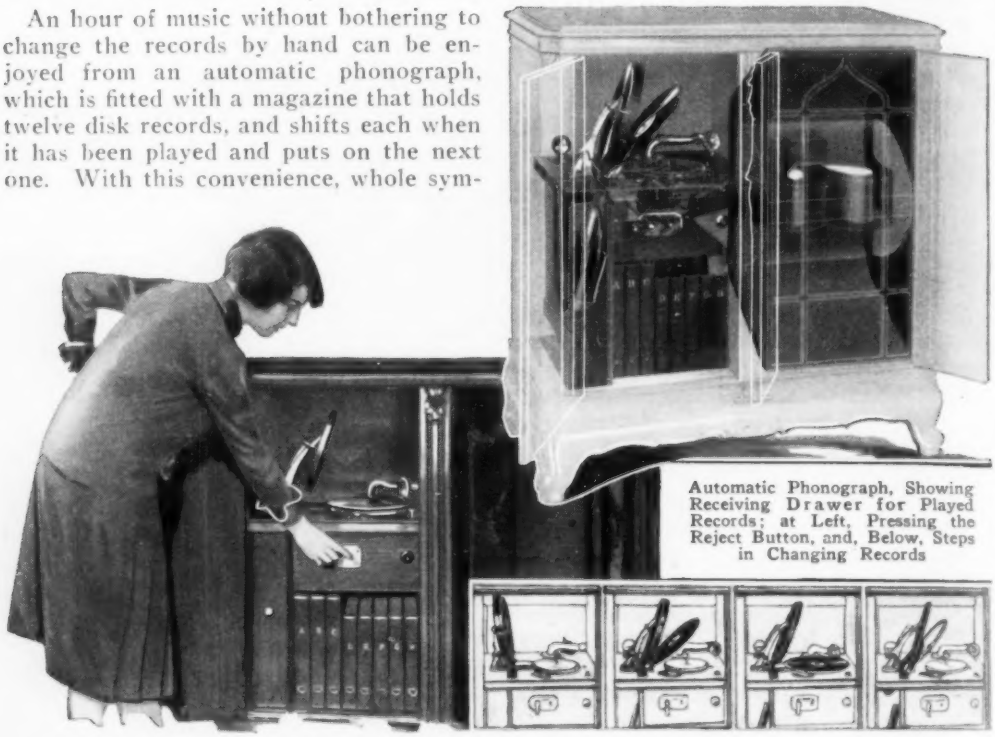
Successful adaptation of Flettner's rotor, the novel method of ship propulsion, to pumping is reported from Berlin. The rotor, mounted on a tower in place of a windmill, was rigged to operate a pump.

TREATING CREAM WITH LIME TO IMPROVE BUTTER

The use of lime to reduce acidity in cream for making butter was discussed recently by Prof. O. R. Overman, of the University of Illinois. The treatment, he says, prevents excessive loss of fat which would result from churning cream that had been pasteurized while very sour; eliminates undesirable flavors, and produces butter that keeps longer. The use of lime as a neutralizer of the acid also gives a small additional food value.

PHONOGRAPH CHANGES DISKS AND PLAYS FOR HOUR

An hour of music without bothering to change the records by hand can be enjoyed from an automatic phonograph, which is fitted with a magazine that holds twelve disk records, and shifts each when it has been played and puts on the next one. With this convenience, whole symphonies may be reproduced and special programs of dance or instrumental music. The apparatus is electrically operated. Removal of records is accomplished by a mechanical "hand" which tilts the completed disk off the turntable into a velvet-lined receiving drawer, takes off the next one from the magazine and deposits it in playing position. The tonearm swings to permit both movements. When the last record has been completed, the motor is shut off automatically. By pressing a "reject" button, any record may be ejected from the turntable at any desired point in the music, and the instrument may be stopped at any time or operated without the automatic feature when single records are to be played. The magazine is adapted to ten-inch or twelve-inch disks, but the two cannot be mixed.



Automatic Phonograph, Showing Receiving Drawer for Played Records; at Left, Pressing the Reject Button, and, Below, Steps in Changing Records

RUBBER LUMBER FOR AIRCRAFT SUBSTITUTE FOR WOOD

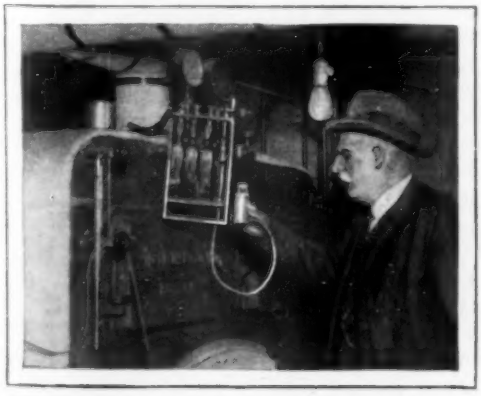
Numerous points of superiority are claimed for a rubber lumber which is intended to replace wood, metal and other materials in many uses. Its strength and lightness commend it for aircraft construction, but it is suited for various other purposes as well. Outwardly it resembles ordinary hard rubber, but in reality it is quite different. The central portion consists of hard sponge rubber with minute air spaces. On each side of the core is a layer of denser rubber compound, and the external surface consists of strong fabric cured as a unit with the section on which it rests. If desired, the fabric may be replaced by metal, such as duralumin, and may be

Cross Section of a Rubber "Board"; Outer Layer of Fabric May Be Replaced by One of Metal if Desired

applied on one or both sides of the rubber board. Tests have shown that the material is stronger than wood, can be worked up into different shapes, does not split, can be softened under high temperatures and loses none of its strength when cooled. Its natural flexibility enables it to withstand great strain, such as encountered in an airplane. It does not absorb moisture, resists corrosive action, and, when used in water, barnacles are said not to settle upon it as readily as upon wood. At the present time, the cost of the rubber lumber is considerably higher than corresponding sizes of wood, but this drawback is expected to be eliminated when production reaches a large volume.

PORTABLE FURNACE-TEST SET REDUCES FUEL LOSS

For rapid and accurate analysis of combustion conditions in furnace fires and the location of boiler troubles, a portable testing outfit is intended to aid the service man and engineer. It includes instruments for telling what kind and proportions of gases are going up the flues, temperatures of the gases, and a draft gauge that shows if the fire is receiving the proper amount of air. Accurate regulation of dampers, reduction of stack losses and location of leaky settings, broken baffles, and other troubles, are possible with the testing outfit. The case can easily be slipped into an automobile or underneath a train seat, weighs less than twenty pounds with all instruments, and there is room for extra tools and overalls.



Testing Set Attached to Furnace for Measuring Gases, to Show How Fuel Is Being Consumed

Another Triumph for Concrete Construction, Huge Mine-Hoist House in Holland

CONCRETE MINE-HOIST HOUSE INSURES RIGIDITY

In order to have a more rigid structure, reinforced concrete was chosen for the material in a hoisting house at the pithead of a mine in Holland. It is 179 feet high, and more than 340 tons of steel rods, plates and iron were used in the building.

PLANTS GROW IN NIGHT

With the aid of special measuring apparatus, Prof. F. M. Andrews of Indiana university has found that the stalks of some plants grow more in the night than they do in the day. The leaves showed as much development in the light as they did when the sun was down.

¶Nearly a third of the homes in the United States are without bathtubs, according to a survey.

Personal-Appearance Mirror for Bus Employes; Attention Is Called to Details Often Overlooked

MIRROR FOR BUS CONDUCTORS CHECKS DRESS POINTERS

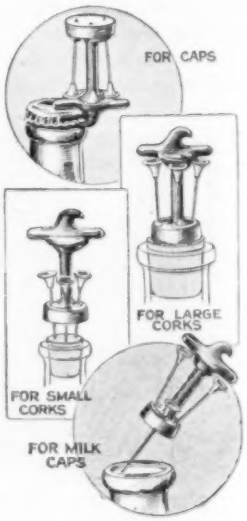
Recognizing the importance of neatness in the personal appearance of its employes, a motor-coach company has adapted a lettered, full-length mirror for the special use of its men. Attention is called to such details as clean collars, polished shoes and leggings, pressed uniform and a shave, so that conductors and others, by checking their reflection with the "gauge," can tell at a glance if they measure up to standard. The plan saves time and enables each man to act as his own "inspector."

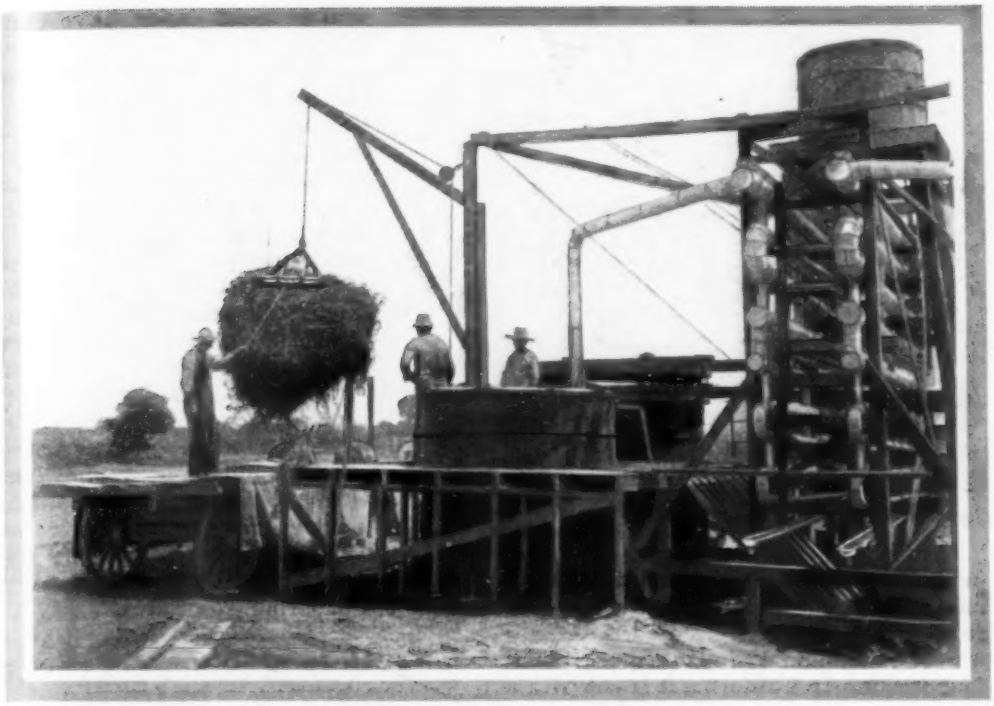
LIVE IN A CAVE FOR TWO YEARS TO STUDY THE SUN

Housed in quarters arranged in a natural cave on the rim of a mountain in southwest Africa, two observers for the Smithsonian institution have started a two-years' vigil to delve deeper into the secrets of the sun. A principal object of the investigation is to gain further data as to the relationship between the sun's variation and the weather. The observatory is the third established in connection with the Smithsonian's study of solar radiation, and the location was selected because of the high altitude and consequent decrease of error due to atmospheric losses, freedom from clouds and the wide distance from other stations, far separation being necessary in order to obtain entirely independent observations. The other stations are located at Table Mountain, Calif., and Montezuma, Chile. For their diversion, the observers have taken along a large supply of phonograph records and will also do some hunting.

CORK PULLER STOPS BREAKING AND REMOVES CAPS

Corks are lifted out of bottles with ease and safety, and without damaging the stopper, by the aid of an all-metal puller which has three long spikes. These are driven into the cork, the top is given a gentle twist and the cork comes out complete and undamaged. The bottle is not jerked or pulled, so that there is little danger of spilling the contents. Broad heads on the spikes keep them from falling out of the puller, which also has a curved notch for prying off caps. To remove milk-bottle caps, one of the spikes can be used.





Charging a Peppermint Still on an American Farm with a Load of Mint Hay; a Canvas over the Wagon Bed Catches Every Leaf Broken off the Stems in Transit, So There Is No Waste

Bringing a Japanese Industry to America

Healing Mint Is Successfully Raised for Menthol in Latest Farming Venture in California

By H. SIBLEY

FOR many years Japan has produced the bulk of the world's supply of menthol, which is made from the oil of the native peppermint.

Although America is one of the largest consumers of menthol for use in healing salves, cough drops and similar preparations, it is only within the past year that Japanese oil has been produced on anything like a commercial scale here.

Preliminary experiments in California were so successful that considerable acreage has been planted to the imported mint, and a number of large stills have been put in operation. It has also been grown in Indiana, Michigan and North Carolina, as well as in Oregon. The Japanese mint must not be confused with the American black-stem mint, raised so extensively in Indiana and Michigan. The Japanese variety has a high menthol content—sometimes as much as seventy per cent.

In spite of the vastly superior and efficient American methods of cultivation and distillation, and the greater yield per acre, Japan is still a serious competitor because the low labor cost is in her favor. In Japan, over three-fourths of all the mint is grown on the northern island of Hokkaido, where only one crop is possible a year. Here three crops have been raised and each has yielded more crude oil than the corresponding acreage in Japan.

Japanese methods present a strange contrast to the American way. When it is in blossom, the harvesters—usually girls—cut the plant with a curve-bladed knife, similar to the old-fashioned mid-west cornstalk cutter. The plants are cut three or four inches from the ground, and then

Japanese Peppermint at Harvest Time; the California Variety Is Much More Heavily Leaved, Yielding More Oil

hung, upside down, on a rack. This is much like a fence with a narrow thatched roof. Here the mint is cured, a process which in that humid climate requires about four weeks. In California it is cut with a horse-drawn mower and cured in windrows in about thirty-six hours. It is then picked up in the morning while the dew is still on it, preventing the leaves from shattering off.

The Japanese still is more primitive than a moonshiner's outfit. It consists of a wooden tub over a shallow iron pan, and has a removable lid which is held as nearly steam-tight as possible by cords. A copper pipe carries off the oil-laden steam through a coil condenser submerged in a tall wooden tank. The water in the tank is replenished by hand, with a bamboo bucket. Dried bean vines, straw, leaves and twigs constitute the only fuel, and it is necessary to fire all day and night to distill a single charge of about eighty pounds of mint hay. The average American still will run through one charge of half a ton in less than two hours.

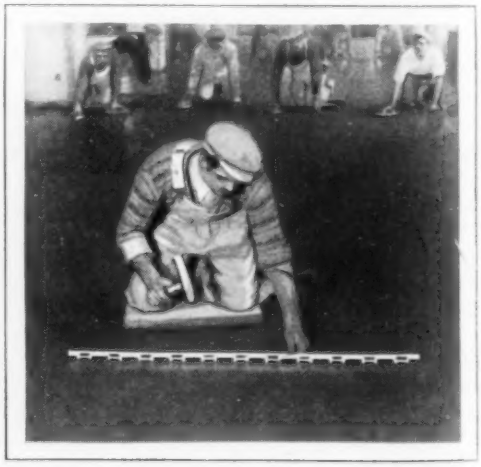
Crude oil from the condenser drips into a bucket along with the distilled water, and as the oil quickly rises to the top, it is readily skimmed off. The farmers all through Hokkaido do most of their distilling in the idle winter months, producing from a few pounds up to two or three hundred, according to the size of their crop. This is then taken up by brokers, who in most cases have contracted for it at the time of planting, and have advanced the farmers money for living expenses.

Some interesting experiments have been made with the exhausted charges of mint hay after it has been distilled. For a time its disposal was a problem, for it could not conveniently be plowed under for fertilizer because of the long, tough stems. However, by accident it was discovered that live stock eat it readily—sheep in particular. Cows like it, but it has not proved a good diet for milk production. Horses eat it greedily, and at least one team, which subsisted upon it almost entirely, grew fat in a few weeks.

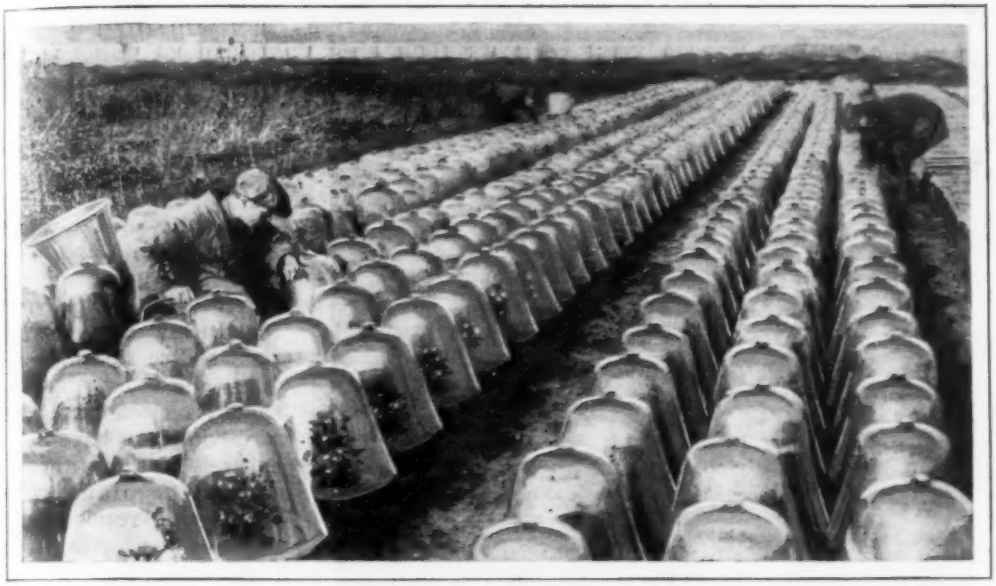
With a bright future, the Japanese-mint industry is the very latest thing in American farming ventures.

LOCK STRIP IN CONCRETE FLOOR TO PREVENT CRACKING

In place of unsightly scored joints, a patented metal anchor strip for concrete floors allows compensation against cracking and improves the appearance of the finished surface. It is especially adapted for use with two or more colors and for flooring consisting of an aggregate of crushed marble and cement, as it prevents scoring and chipping between sections.



Metal Strip Being Applied to Composition Flooring; the Locking Units Are Seen at the Side



Where Each Plant Has Its Separate Greenhouse; Globe-Covered Garden in England for Producing Early Vegetables; the "Bells" Are Easily Removed for Tending the Growth

GARDEN UNDER GLASS BELLS YIELDS EARLY PRODUCE

Bell-shaped glass covers, one for each plant, are used in a vegetable garden in England. They are considered more successful in some respects than the usual hotbeds, as separate plants can be given special care, the "bells" are easily carried about and lifted off, and no permanent structure is needed.

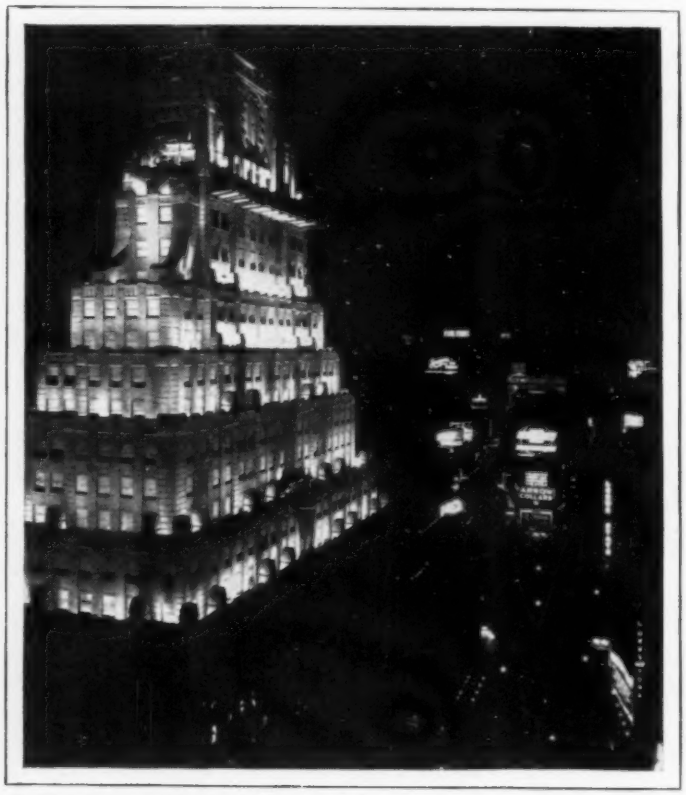
TWO-BLADE WINDSHIELD WIPER CLEARS ENTIRE GLASS

Driven by motor suction and controlled by a switch on the dash, directly in front of the driver, a double-bladed windshield wiper cleans the entire glass, and, when not in use, occupies a position that will not interfere with his vision. The blades are fixed in a vertical plane and move from side to side, the lateral action permitting moisture to run downward to aid in ridding the shield of snow or rain. Each blade cleans half of the glass. The motor is in the shape of a long tube which is fastened under the visor just the width of the shield.

Two-Bladed Wiper Installed, Showing How It Keeps Entire Surface of the Glass Free from Snow or Rain

ELECTRIC EYE TO COUNT AUTOS DOES WORK OF POLICEMAN

One of the latest adaptations of the photoelectric cell is for the purpose of counting the number of automobiles that pass a given point in a day. Installed on a lamp-post on one side of the street and exposed to a source of light from the other, it serves as an accurate traffic register, saving the work of a special policeman, or other attendant, for the task. The counting is done as the passing automobiles interrupt the beam of light to the cell. Their shadow causes sufficient reaction to operate an automatic counter, and a faithful record is thus kept for each day. Other uses for the cell include color matching, sorting cigars and certain vegetables, transmitting photographs and motion pictures by radio, and recording time signals.



Glowing Terraces of the Night; Illuminated Upper Stories of the New Paramount Theater Building in New York City

LIGHTS ON THEATER TOWER RIVAL THOSE OF STREET

Like the buildings, the brightest spots of the modern city are reaching toward the sky. This is shown in the illumination on the crest of the Paramount theater building in New York. Its pyramid tower is floodlighted at night under the brilliance of powerful rays that emphasize the evenly back-set outlines of the upper stories and seem to dim the glow of the signs and displays on Times Square below. Entirely aside from the viewpoint of picturesqueness and beauty, the installation of such a lighting system is considered sound and practical advertising, since it calls the attention of night crowds to the building's features which otherwise would go unnoticed in the darkness.

BUGS SAVE RANGES IN AUSTRALIA

Insects from Texas and South America are being used with great success in Australia to devour the prickly pear that infests the live-stock ranges. A cochineal bug, a red spider, a moth larva and a sucking bug have been enlisted in the warfare against the plant with such good results that the spiny growths have been reduced to a state of utter collapse, according to reports. An additional encouraging feature is that the insects are not likely to attack crops or other desirable vegetation. A possible source of trouble is seen in a kind of beetle that feeds on grass-eating mealy bugs, but it is believed that, by the time these insects are exhausted, the prickly pear will have been conquered, so no great harm will be done if the beetle attacks the helpful bugs which have been introduced to eat the plant pest. A similar experiment, attempted in Hawaii, was not wholly successful, because the insects also attacked a valuable plant.

AUTO TRUCK SERVES AS TRAIN ON BRANCH RAILROAD

"Flivver" Fast Mail on Missouri Railroad; an Auto with Flanged Wheels Makes Prompt Deliveries

Fitted with railway-car wheels, an automobile truck is run upon a small branch railroad in Missouri to carry the mails. The cost is only a fraction of that required for a steam train, and the schedule is said to be almost as fast.

HUNGER BEATS MOTHER LOVE OF UNIVERSITY'S RATS

Hunger is a more compelling motive than either mother love or the desire for companionship, Dr. F. A. Moss, of George Washington university, discovered when he made a series of tests with rats. The reactions of the rodents, he believes, fixes rules that also will apply to other animals and, possibly, to man. Dr. Moss used a cage built in three parts, with the center section so wired that a rat passing through it received a slight electric shock. Ten rats were placed in one end and food in the other. Within seventy-two hours eight of the ten risked the shock to reach the food. In the next experiment mother rats were installed in one section and their young in the other, but only three of the ten mothers would pass the charged wires.

BRANDING TORCH MARKS TIRES BATTERIES AND CUSHIONS

To identify tires with initials or mileage records and to stamp batteries, cushions and other accessories, a hand torch holding a pint of fuel, is also equipped with a disk having ten numbers or separate letters. They become heated in a few minutes and the torch may be used steadily for any combination of numbers desired, as all are hot. Stamping a purchaser's initials on a tire has been found an effective way to increase trade, and the torch is well suited to such a purpose.

STREET-CAR WINDOW HEATER KEEPS GLASS CLEAR

Electric heaters on the sills of windows in street-car vestibules have been found effective in keeping the glass free of snow and frost, so that the motorman has a clearer view. The heater occupies but small space and requires little current.

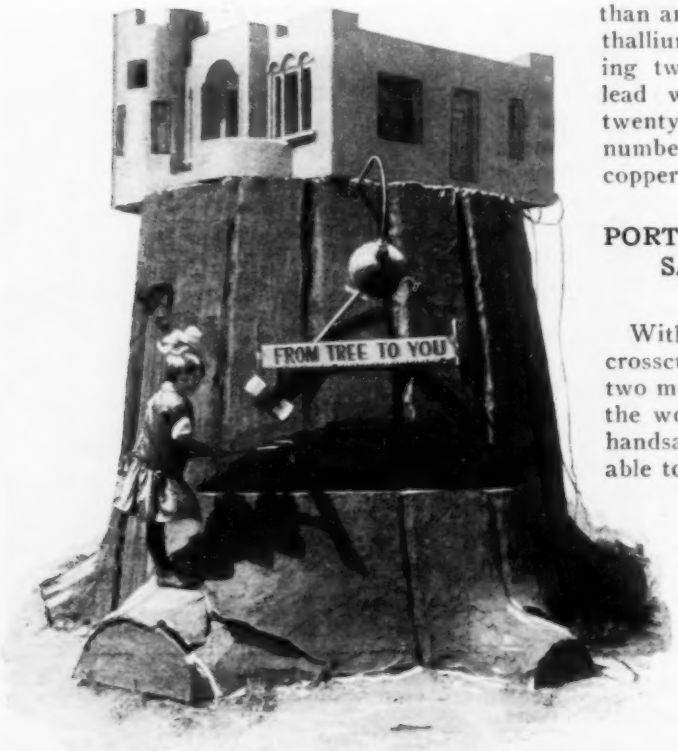
Looking into the Portable Plumbing Shop Which Has Space for More than 2,000 Different Articles

PLUMBERS' "PIE WAGON" CARRIES MANY TOOLS AND SUPPLIES

Men from a Chicago plumbing concern are not likely to arrive on a job without the necessary tools and equipment, for they travel in autos modeled after a pie wagon with bins and shelves for more than 2,000 different articles. The firm has seven of these cars.

QUICK-ACTION CIGAR LIGHTER HAS WEIGHTED BASE

Occupying but small space on the counter, an electric lighter for smokers has a weight in the base to prevent tipping over and the element heats up almost instantly when the button on the side is pressed. It is designed to consume less current than the usual type.



To Catch the Eye of the Home Buyer; Real-Estate Sign in Los Angeles Which Emphasizes Direct-Purchase Plan

IMITATION TREE STUMP USED AS REAL-ESTATE SIGN

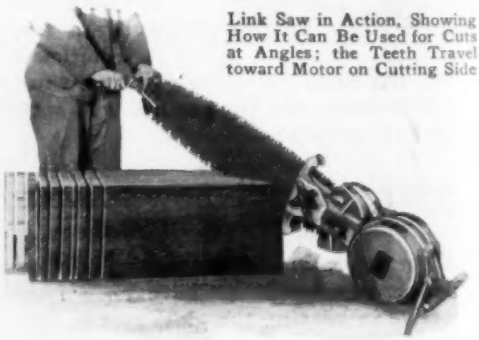
Prospective house and real-estate buyers in Los Angeles are attracted by an imitation stump on which is mounted a model of a cottage and an appropriate sign, erected by a dealer. The device emphasizes the idea of direct transaction from tree to finished dwelling, and is further decorated with imitation woodsmen's tools and a realistic cut as though the stump were being felled.

IRIDIUM IS HARDEST METAL THALLIUM THE SOFTEST

Iridium, a metal belonging to the platinum group and often used on the tips of fountain pens, is the hardest pure metal known, recent tests have shown. Molybdenum is next and tungsten third. Of the common metals, nickel is the hardest, ranking fifth. The tests did not include alloys, such as those of steel with a high percentage of carbon, which rank higher than any. The tests showed that thallium is the softest metal, being twenty-fourth on the scale, lead was twenty-third and tin twenty-second. Gold ranks as number eighteen, silver fifteen, copper eleven and iron ten.

PORTABLE ELECTRIC SAW SAVES MUCH TIME AND WORK

With an electrically operated crosscut saw now on the market, two men are said to be able to do the work of seven or eight with handsaws, and the outfit is adaptable to a wide range of tasks. A feature of the saw is the arrangement of the teeth. These are made in links and their action is the same as that of a rigid saw. On the cutting side, they travel toward the motor so that they keep the saw against the work, eliminating the need of "dogging" or fastening. Control is afforded through a foot switch, and the cutting direction of the teeth can be reversed to equalize wear and reduce the frequency of filing. The saw operates on 220-volt alternating current from a power circuit or from a portable motor generator. It is especially adapted to trimming timber, cutting posts and mine props, notching railway ties, cutting piling and similar work. The outfit is made in three sizes, weighing from sixty-four to 104 pounds.



Link Saw in Action, Showing How It Can Be Used for Cuts at Angles; the Teeth Travel toward Motor on Cutting Side

Motor Cops of the Sea

By H. H. DUNN

Captain Bouton, Seventeen Years in the Fish Patrol, at the Helm of His Modern Pirate Chaser

OUT where the west ends, and one state pulls $25,000,000 worth of food out of the sea every year, modern inshore piracy, parasitic on this large industry, is being checked by policemen mounted in motorboats. Just as deep-water fishing is one of the most picturesque of all industries—to the landlubber, at least—so life on the boats of the fish patrol of the California state fish and game commission compares for dash and danger with the life of a Texas ranger or the business of being a prohibition patrolman along the Canadian border.

There is a romance about the sea and its men, some of which has been passed on to the deputies of the fish patrol in the more than a quarter of a century of the existence of this water police force. They deal with pirates in fast boats who seek to rob the commercial fishermen; with outlaw fishers who use seines with meshes smaller than the law allows, and who fish during closed seasons; with fishermen who take in nets fish whose capture is permitted only with hook and line; with hunters who shoot ducks and geese for market, and with game-law violators of all kinds.

With This Specially Designed Grappling Hook, the Game Wardens Defeat Poachers Who Sink Their Illegal Nets to the Bottom

The "beat" of the fish patrol is the whole state of California, wherever there is water deep enough to float their motorboats. Jack London wrote a book about them, away back at the beginning of the twentieth century, called "Tales of the Fish Patrol," and while few of the old-timers mentioned in that book are still on the patrol, the modern pirates of San Francisco bay and its tributary waters have so increased that the patrol is larger, stronger and busier today than it ever has been. Those who seek to prey on the fishing industry of California, and to loot its wild life, are increasing in numbers, in spite of the greater number of law violators captured every year.

These are some of the facts Charles Bouton and Bert Laws,

captain and crew, respectively, of the forty-foot motor patrol boat "Quinnat," told me as we pulled away from Fishermen's wharf and its 500 fishing boats, one warm morning. Crossing the channel that leads out through the Golden Gate, I learned that "Quinnat" had been in service for seventeen years, "without having so much as a shim removed from her bearings," according to Laws.

Forward, in "Quinnat's" heavy but capacious hull, were quarters for six men, but most of the space aft was taken up with the large and powerful motor, cooking accommodations, and the racks of rifles and shotguns—for not infrequently a fight with armed poachers is thrust upon the members of the patrol. Ability to shoot being one of the qualifications demanded of the deputy commissioners, however, most of the poachers, if cornered, surrender, and the battles of ten or fifteen years ago are becoming memories to most of the patrolmen.

North by east, across San Francisco and San Pablo bays, and into the flat, shallow, reaches of Suisun bay, we held, until we were in a maze of islands, overgrown with wild rice, concealing the mouths of sloughs —the retreats of the poachers, illegal seiners and game-law violators. Presently, we heard what sounded like machine-gun fire, and out of the fog came a low, gray, almost invisible craft, spreading the water in a wide wake of foam on either side as she rounded to and lay alongside "Quinnat," which Laws had brought to a stop. In the newcomer was a middle-aged man, William H. Armstrong, veteran deputy commissioner, member of the fish patrol since 1901, and master of the thirty-miler "Hunter," recently added to the fleet.

Armstrong and Bouton conferred for a moment; "Quinnat" moved ahead at her maximum of twelve miles an hour, while "Hunter" lagged behind. We rounded one island, passed between two others, and heard the yammering of a fleeing motorboat, the foam of whose wake marked the still waters of the bay. Bouton pulled three sharp blasts out of "Quinnat's" air whistle, and we held on to where wide ripples yet marked the place where something had been dropped into the sea.

We came to a stop. Laws stepped out on the bow of the patrol boat, an odd, five-pronged, weighted hook, rove with a chain leader into eight or ten fathoms of line, in his hand. This he dropped overboard, sinking it to the bottom, some fifteen feet

Foe of the Fish and Game Poachers, the "Quinnat" Scouts the 400 Miles of San Francisco Bay Shores on the Lookout for the Bay Pirates Who Seek to Elude the Game Laws

Fishermen's Wharf at San Francisco, Before All the Fleet Had Been Motorized; the Plans for the Double-Ended Boats, with Their Queer Lateen Sails, Were Brought from Naples and Corsica

down, and dragging it back and forth with experienced hand until he found what he sought, then lifting it inboard. As the hook came up, a brown seine came with it, nearly 2,000 feet of expensive netting, sunk to the bottom with blocks of cement, whose writing of ripples on the surface had been read instantly and clearly by both the patrolmen.

Out came gauges, and the meshes, measured, were found to be nearly an inch under the legal limit, and thus capable of taking small fish protected by the commission. Meanwhile, the whistle calls had been answered. A long, wide-beamed but fast fishing boat, half filled with striped bass, illegally taken, came round one of the islands, and, immediately behind her, Deputy Armstrong in "Hunter." Leaning forward out of the cockpit, one hand on the wheel and the other well equipped with a heavy automatic, Armstrong was running his engine controls with his foot, the while the three men in the captured boat obeyed his orders.

Followed by the "Quinnat" alone, the poachers would have escaped easily, but they were no match for the thirty-miler. Most of the bass were dumped back into the bay, where many of them swam off uninjured. A few were kept for evidence, as was the net, worth at least $500, and probably actually costing twice this amount. The larger patrol boat took the poacher in tow, after transferring her crew to her own decks, and we started back for San Francisco. Armstrong, in his rightly named "Hunter," slipped back into the fog, to lie in wait among the islands for another pirate.

Later in the day, he came in driving a large power dory, with four men, whom he had caught shooting ducks from their boat—double violation of the law, since the duck season had closed, and there is a ban on hunting game birds from a power boat on any waters in California. During December and January, last winter, "Quinnat" and "Hunter," and the three men on duty with them, have taken illegal seines valued at more than $3,000, all submerged by means of weights when their owners

fled, but picked up by the specially designed drag with rounded hooks, which do not catch on snags, but gather the meshes of the net.

By night, the patrol boats move through the sloughs and tributary bays, and around the mouths of streams emptying into the bay. All their lights are out, and they seem to "feel" their way, never going on the banks, or meeting with accident. The patrolmen watch for the reflection of the lights on the boats of the poachers, or the sounds of their motors, and, with muffled engines, try to creep upon the law violators, and to take them at work. According to M. S. Clark, captain-in-chief of the patrol, the men on the boats know every foot of the more than 400 miles of coast line of San Francisco bay, and are familiar with the sea for fifty miles outside the Golden Gate.

After the poachers are captured, or the market hunters taken, with their seines and fish or their decoys and ducks, the work of the fish patrolmen has just started. Then they must deliver the lawbreakers to the nearest judge, or, if far up the bay, to some landside justice of the peace, and convince the court that the captives must be held in sufficient bond to insure their appearance at trial. Thereafter, when the trial comes along, they must present the evidence to judge or jury in such form and in such quantity that the guilt of the arrested men is established and conviction obtained—and it is only on rare occasions that they do fail in this.

More than 5,000 commercial fishermen, operating more than 3,500 boats, are licensed by the state of California, and there are some 12,500 persons employed in the industry. The patrolmen must be sufficiently familiar with these men and their boats not to mistake one of them for a poacher and not to interfere with the bona-fide licensed fisherman going about his legitimate business.

Without motorboats and other modern mechanical equipment, the fish patrol could not succeed, and this year two or three more speed boats are to be added to it. Then the buccaneers of the fishing industry of California will find the law closing still tighter upon them.

AUTO-TRUCK SERVICE RECORDER REDUCES DAILY WASTE

Few operators of motor trucks keep an accurate record of the actual time the vehicle is in service each day, idle time, waiting, and other data, upon which to base a close estimate of running costs. This information is supplied by a simple indicator which tells the story of the truck's movements every hour of the day. It is essentially a clock arrangement with a swinging pendulum actuated by the swaying of the vehicle. This action causes a sapphire point to scratch off a mark on a wax-coated card which bears the hours of the day printed in a circle like a dial. The marker is set to correspond to the time of the day; the clock movement is wound, a chart is inserted and the gauge closed. It requires no other attention until the record is to be taken out. Due to the swaying of the truck, the period of actual running is designated by a wider mark on the dial than the thin line which indicates stationary intervals. If the motor is left running while the truck is stopped, that is shown by a mark slightly narrower than the running line, yet wider than the stop tracing. The device may be utilized on various machines, such as looms, knitters, locomotives, presses and many other units for keeping a record of their operations.

Attaching the Truck Service Recorder to the Cab, and, at Right, One of the Charts, Showing Time of Operation

STRUCTURE OF HAIR GIVES CLUE TO PERSON'S IDENTITY

In the discovery that hair is a certain mark of an individual's identity, scientists have an additional means of detecting the criminal. Examined under a microscope, a hair is seen to have fine, overlapping scales like those of a fish and a canal in the center, containing the coloring matter. No two persons have hair structure exactly the same, some of the chief points of identification being the size of the hair and the central canal, and the scales.

STEEL CABLE IN WINDY CANYON PROTECTS PEDESTRIANS

In one of the narrow passes on the island of Oahu, H. I., the wind blows with such force that a steel cable has been attached to the rocks to afford a handhold for tourists. Before it was installed, many pedestrians had been blown off their feet and one man killed. The portion where the wind attains its greatest velocity is short, scarcely more than fifty yards, and as the canyon widens out beyond that, the speed is much diminished. Winds at fifty and sixty miles an hour are recorded almost daily at the narrowest point. Automobiles traveling the motor road near by are frequently damaged by the gale, which is strong enough at times to tear tops off and break windshields.

Rounding the Windy Point Where Gales Blow Almost Constantly; Cable Gives Pedestrians Handhold

Cameo Portrait Cut in Sea Shell; Twenty-Five Tools of Various Sizes Were Needed

PORTRAIT-CARVING ON SHELLS LATEST ART NOVELTY

Cameo portraits, cut on large sea shells, are produced by a Los Angeles craftsman who has found the work a pleasant although somewhat difficult hobby. The chief trouble is that the shell is very brittle, and a chip or a break at any time may ruin the entire carving.

SPORT OF CRICKET FIGHTING FAVORITE IN CHINA

Matches between specially bred and trained crickets arouse as much interest in China as boxing bouts do in other countries. The insects are weighed in on miniature scales before the battle, placed in an earthenware jar and, if slow to fight, are incited to the conflict by tickling them on the legs or head. Once started, the combat becomes fast and furious, and is often fought to a fatal conclusion. The name of the victor is inscribed in gold on an ivory tablet, which is presented to the proud owner. Cricket fanciers take elaborate care of their pets, providing them with cool jars, artistically fashioned, in summer and fitted with tiny porcelain feeding dishes and clay beds. In winter, they are housed in specially grown gourds and sleep on cotton pads.

Rider Trying to Dodge the Flood When Tilting Bucket Is Capsized in New Scottish Novelty Race

TILTING BUCKET ADDS NOVELTY TO MOTORCYCLE RACE

Motorcycle meets in Scotland have a novelty in the form of a tilting bucket which drenches the luckless rider who springs the trap, the degree of drenching depending upon the speed with which he passes under and gets clear. The bucket of water is mounted on a revolving board, and is normally held upright by a weight slung underneath. When the motorcycle passes under it, springing the trap, the position is reversed and a couple of gallons of water are poured on the rider.

MORE RISK IN PLAY THAN IN WORK

You are more liable to injury during your hours of recreation than in working periods, according to the findings of an official of an eastern insurance company. A steel worker straddling a girder high on a building runs less risk of being hurt than when hanging a picture at home from the top rung of a stepladder. The reason, this official explains, is that when a man is at his occupation, he is on the alert against danger. When at play, he relaxes, thinks of other things and is less careful when hazard is involved. From data extending over many years, insurance rates have been graded according to classifications based upon the likelihood of injury. The classes range from 1 to 5, the first being those in the least danger and the last, those exposed to the greatest hazards. In addition to these, there is the "FF" group or those in extra dangerous callings. Baseball players are in this division as are soldiers during war time, aviators, circus performers, acid makers, balloonists and consuls to foreign countries. Policemen on beats are placed in class No. 4 and firemen in division No. 5. Insurance officials estimate that the automobile has increased accidents in America between thirty-five and forty per cent in the last ten years. With regard to health insurance, the doctor who is exposed to all sorts of infection during his daily work, is the most likely to contract disease. Dentists

are also poor risks and so are ministers. The banker is comparatively safe. It has been found that, during times of business depression, susceptibility to disease soars regardless of occupation. The age at which the liability is greatest is between forty-five and sixty, when the vitality of youth is no longer present to throw off ailments.

BEETLES SEALED IN GIANT TREE TWELVE HUNDRED YEARS

That no appreciable changes have occurred in a species of wood-boring beetle in the last 1,200 years is indicated on comparison of live specimens with dead ones which were recently found hermetically sealed in a giant Sequoia tree. The insects apparently had entered the wood after it had been struck by lightning. Some failed to emerge and were imprisoned by the new growth that formed over the lightning scar. The time they entered the tree was computed by counting the annual rings that had grown outside of them. Naturalists are not surprised that the specimens were the same as those found alive today, for beetles are regarded as a "conservative lot," and 1,200 years is not a long time, geologically speaking. Species that were sacred to the Egyptians have shown no signs of change in thrice that time.

STREETS OF OLD ROME CLEANED BY MODERN SWEEPERS

Contrasts between the old and the new are plentiful in Rome, and one of the most noticeable is the modern, motor-driven street sweeper, cleaning up dust and dirt from pavements that were laid in the time of the emperors. One of the most popular types of brooms is mounted on an automobile chassis. It is of the rotary kind, similar to those used in this country.

Ancient and Modern Rome in Striking Contrast; Motor Street Sweeper on Historic Highway

Comparing Smoke from Chimney with the Testing Chart, to Determine Density

DENSITY OF SMOKE IS TESTED WITH SHADED CHART

How much can a chimney smoke and stay within the law? Many cities have expert observers to answer the question, and one of the most efficient guides they employ is a test by which the density of the smoke is gauged. It is simply a series of black lines drawn at right angles on a white background and so arranged that the observer notes different percentages of blackness when the chart is placed at a distance of fifty feet. The tester is hung on a level with the eye and in line with the chimney. By comparing the shade of the smoke with that suggested by the most closely corresponding section on the chart, the inspector is able to determine, with a fair degree of accuracy, if the anti-smoke ordinance is being observed. The areas on the card are plainly marked to indicate percentage of blackness.

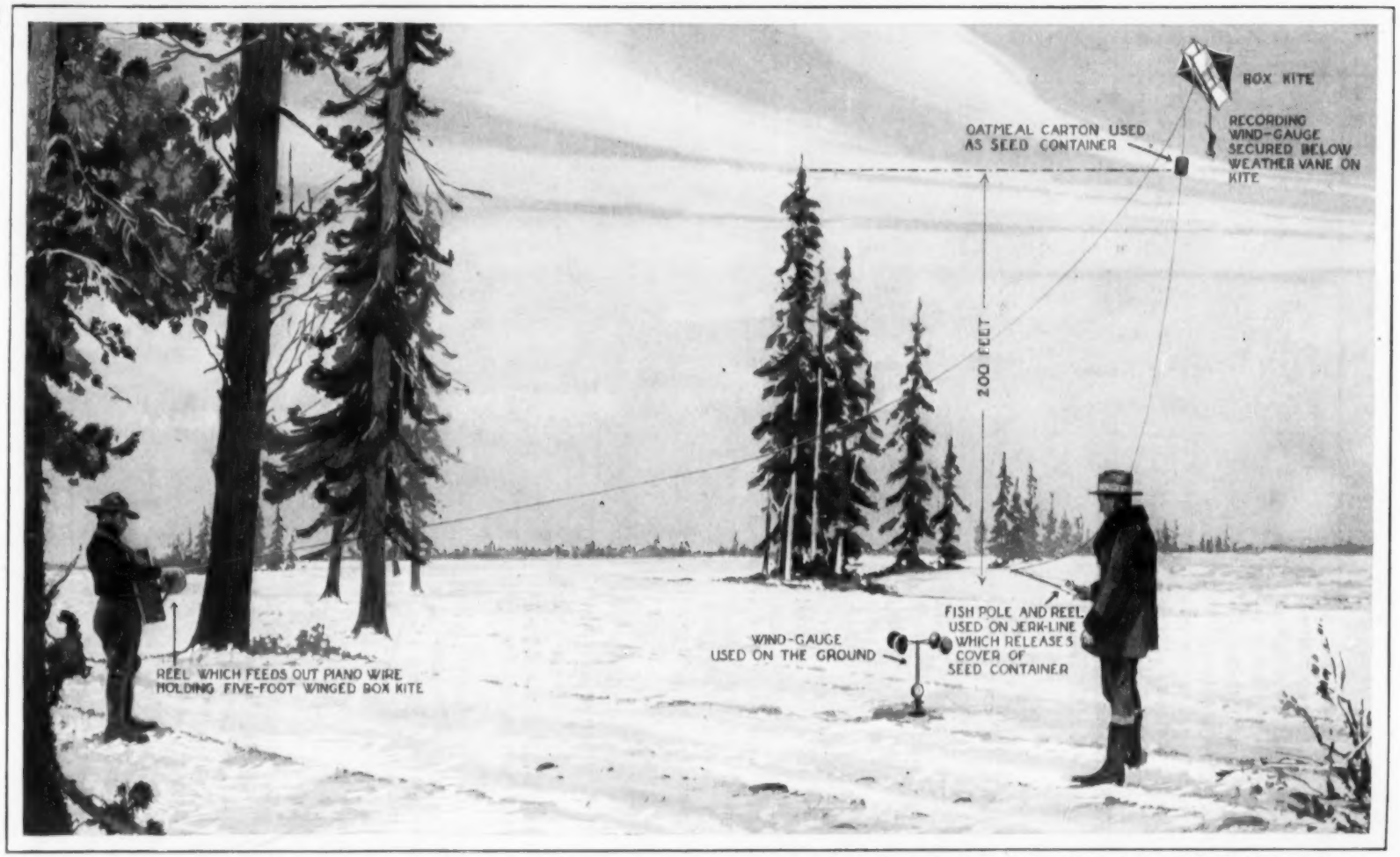


Photo Diagram Showing How a Box Kite, an Oatmeal Box and a Fisherman's Reel Helped Solve the Problem of Spacing Left-Over Trees So Their Seeds May Be Blown About to Accomplish Natural Reforestation

Counting the Seeds in Sixteen Square Feet After They Have Been Released High in the Air from a Box-Kite-Carried Container; Some Seeds Were Blown Two-Thirds of a Mile Away

Kites Solve Problem of Tree Seeds' Flight

Forestry Tests Imitate Nature and Disclose Extent to Which the Wind Can Aid in Reforesting Logged-Off Land

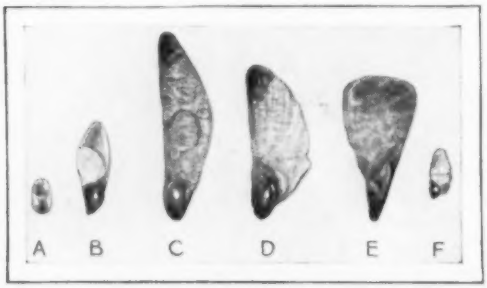
WITH a box kite, a fishing reel and an ordinary pasteboard oatmeal carton, forestry officials in the west have solved the question of how much the wind can do toward reforesting cut-over land by spreading seed from standing trees. With the homemade apparatus, they sent half a million seeds of different species up in the air to the height of an average tree and then released them to be blown away, while gauges on the kite and ground gave accurate data on wind velocity.

After the seeds had settled, the forest experts picked up all those found in measured areas at different distances and computed the general distribution. To facilitate the recovery of the seeds, they worked in the snow on a wind-swept plateau with the thermometer well below zero. The seeds were plainly visible on the white ground, but the crew suffered considerably from the intense cold.

The tests, which were originated by the Pacific Northwest forest-experiment station, at Portland, Oreg., were carried out by the U. S. forestry service in co-operation with forestry officials of the province of British Columbia, so that the results could be applied on both sides of the international line. They discovered that a single tree left standing could distribute its seed as far as 3,500 feet away in a twenty-three-mile wind.

The apparatus used included a big-winged box kite, capable of lifting fifty pounds in a fairly strong wind. The kite was let out from a reel of fine steel piano wire, and carried aloft, attached to its tail, a homemade weather vane to show the wind direction and a wind gauge to record its speed. An oatmeal carton, hung upside down beneath the kite, carried the seeds, the cover being fastened with fine thread. A stout fishing line was arranged to break the thread and release the seed, the line being payed out from an ordinary

fisherman's reel. Besides the seed, the box contained a lead weight, attached to a cloth streamer, so that it would drop



Six Types of Seed Used, Red Cedar, Douglas Fir, White Pine, Yellow Pine, Noble Fir and Western Hemlock

to the ground directly under the box at the moment the seeds were released, and furnish a marker from which to measure the distance to the finds.

In operation, the kite was let out, and the fishline, marked with tabs at twenty-five-foot intervals, was fed out at the same time. When the tabs indicated the seed box was 200 feet above ground, the height of an average tree, the reel brake was applied, the taut line broke the light thread on the box cover, and the seeds were whisked away by the wind.

Seed counts were made every hundred feet down wind from the point of release, all the seeds recovered in the space inclosed in a four-foot-square frame being counted. The tests revealed that the shape of the seed had more influence than either size or weight. Light western-hemlock seed and the comparatively heavy western white-pine seeds made the best distance records, about 4,000 feet. Besides these two varieties, seeds of the western red cedar, Douglas fir, western yellow pine, and the noble fir were used—six different varieties in all.

At the start of the tests, the forestry experts believed the wind might blow the seeds from 200 to 300 feet. In a six-and-a-half-mile wind, however, seeds were found as far as 1,800 feet away. None of the seed fell within 150 feet of the point of release, but it was discovered that the number that came down at the 150-foot mark, dropping out of the race at the start, was about the same as the number that flew 3,500 feet. Another peculiarity found was that the seeds, instead of covering a fan-shaped area, as had been expected were distributed in an almost straight path While the experiment showed that a kite might be used to reseed large areas, the real purpose was to obtain information to guide lumbermen in leaving occasional trees to accomplish natural reforestation. As the prevailing winds at seed-dropping time are known, it will be possible to space the trees so that their seeds may be expected to cover the entire area.

SOUTH SEA MYSTERY SOLVED IN FINDING LOST IDOL

Sought for several years, the wooden image of the "shark goddess" of the Gilbert islands, the only one in existence, has been found and is now in the possession of Frank Burnett, explorer and collector of South sea relics. Discovery of the figure reveals a fascinating story that goes back into the centuries and has high lights of adventure and mystery like those associated with the history of lost jewels and other treasure. Briefly, the story is this: Centuries before the white man came, the shark was a god to the natives of the islands in the south Pacific. Altars were built to it and food offerings made, some of the [illegible] becom[illegible] [illegible]me that they thronged the beaches. There lived a powerful chief whose daughter was believed to be im[illegible] [illegible]m the sharks and who could impart the same gift to others. Short[illegible] worship of her supplanted the old gods. At her death, her likeness was carved in a block of rare wood brought from the east. The idol was placed in a special house and was known as the "Shark Woman." In

1892, a British captain found it enthroned in the "House of Skulls" on the island of Apamama, a temple that was used by a chief as a receptacle for the heads of rival chieftains whom he had slain. Before the House of Skulls was destroyed by official order, the priest who had attended the idol, learned of the forthcoming destruction by secret means, revealed the hiding place to a white man who had done him a favor and told him the foregoing story of its origin. The white man was traced to Australia and there Burnett found him and secured the idol. The story is substantiated by the peculiar wood of which the idol is made and by the rough carvings which indicate that it was fashioned with crude tools made from giant clam shells, the only material the natives had for such purposes before the Europeans arrived.

HAND STRAP HOLDS GOLF CLUB TO IMPROVE STROKE

To help correct the tendency to overswing, slice or hook the golf ball, a hand socket strap for the club has been designed. Its function is to relieve the strain incident to stopping the club on the upward movement so that the fingers will not relax their grip and allow the clubhead to drop below the left shoulder. The strap is said to insure the proper start on the downward swing, reduce soreness of hands and add distance to drives, as it improves timing.

Golf-Club Strap in Use, Showing How It Corrects the Tendency to Make an Over-Swing

To Be Conquered by Rails? Castle of Lichtenstein in Southern Germany, Objective of Train Line

RAILWAY TO FAMOUS CASTLE TO SERVE TOURISTS

Plans are on foot to construct a railway to the top of the cliff on which is perched the famous castle of Lichtenstein in southern Germany. The place is visited by hundreds of tourists yearly.

WILD-LIFE REFUGE IN ALASKA TO PROTECT BEAVER

Sanctuaries for wild animals have been established at Curry, Alaska, and at other points in the territory, to preserve beaver, muskrat and other creatures that are becoming scarce. Bears, wolves and wolverines may be hunted within the reservations, which are placed under the jurisdiction of the department of agriculture.

SPEEDBOAT SETS NEW RECORD OF SIXTY MILES AN HOUR

Previous speed records for motorboats in the 151-class were broken recently when the hydroplane "Angeles" was driven at the rate of 60.11 miles an hour over the test course on Newport bay near Los Angeles. The mark bettered by more than thirteen miles one which had been made shortly before by another craft of the same type. At the end of its spectacular performance, the "Angeles" skidded and was wrecked, but the pilot was unhurt.

Warming into a Mile-a-Minute Pace, the Motorboat "Angeles," Champion of the 151-Class, Roaring down the Test Course; It Broke Previous Speed Records by Thirteen Miles

"JUNGLE" FOR ZOO ANIMALS PLANNED IN ENGLAND

A 400-acre "jungle," where lions, tigers, elephants and other animals will roam at will through inclosures bordered by concealed fences and moats, is to be built by the London zoo, at a cost of $1,000,000, in southern England. The scheme of development is to cover forty years, and provision is to be made for airplane-landing fields so that zoo visitors of the future can fly to the spot in their own planes. Planned primarily as a country home and "resting ground" for inmates of the London zoo, the scheme also contemplates a bird and animal sanctuary to preserve British birds and beasts, and a section devoted to native English plants and flowers. The animals on exhibit in London will be relieved every few months and sent down to the country to get a taste of near-wild life, others, which have rested and recuperated, being sent up to take their places in the city cages. The site chosen is in a bit of "wild" country, where deer roam the forests, where cottages are lighted by oil lamps, and with the nearest railroad ten miles away.

SHOOTING AT MOVING PICTURES LATEST RIFLE PRACTICE

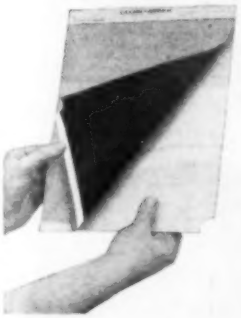
Hunting game through the medium of the movies and receiving excellent practice in skill with the rifle thereby, is one of the latest indoor sports introduced in Berlin. As the pictures flash across the screen, the marksman takes aim and fires. The instant the bullet strikes, the film is stopped so that the results of the shot may be observed. The equivalent of many ranges and a wide variety of other factors are realized with this apparatus, which is gaining rapid favor in shooting galleries.

Big-Game Shooting in the Rifle Gallery; Firing at Pictures of Animals on Screen; Camera Stops as Hits Are Made

CAT PATROL KEEPS CAPITOL FREE FROM MICE

Not the least important among the many employes that keep the government machinery running, are "Mary" and "Dirty," two cats that patrol the basement and other parts of the capitol in Washington to keep it free from mice. Both waifs, and befriended by attaches of the building, the cats have proved their usefulness and are now enrolled on the capitol watch. "Mary" starts her day about four o'clock in the afternoon by strolling forth from the basement room where she sleeps. Her movements are unknown from then until about five o'clock in the morning, when she appears for her breakfast of liver. Mice that "Dirty" catches are proudly laid at the feet of G. R. King, assistant manager of the senate restaurant. Her first assignment was to guard the potato bins, where she is locked up each night. Not long ago, a cat got jammed in a ventilator shaft while following a fleeing rat. For some time, there was opposition to further use of the animals, but when rats took possession of some valuable records stored in the basement, it was decided to again enlist their services against the pests.

CARBON PAPER IN CUSHION BACK SAVES TIME AND WASTE



To save the stenographer time, improve the quality of work and prolong the life of the carbon paper, a binder arrangement with a cushion back has been devised. One or more sheets are stitched to it at the top, and at the bottom, they are uncoated so that the fingers will not be soiled in handling them. There is a thumb hole at the right-hand bottom edge for removing all the copies at once. The cushion insures more even impressions, the copy paper is kept smooth and in place, and the operator need not spend time in alining the separate sheets by jogging them, as this is already done with the carbons.

© Keystone View Co.

Putting On a Roof with Hose; Cement Is Sprayed on Wire Netting Attached to Steel Framework

CEMENT GUN AIDS IN BUILDING SEMICIRCULAR ROOF

Uses for cement have been greatly increased through the method of applying it with compressed air from spray nozzles, and one of the newer developments is the hemispherical roof for dwellings and other structures. A framework of steel sheets and wire netting is first arranged, and the cement "fired" upon the mesh. When it has set, the steel forms are removed.

DOLL'S HEAD THAT LIGHTS UP LATEST BATTERY NOVELTY

Attached to the end of a small electric battery, a doll's face glows when a wire at the base is pulled. The action completes the circuit, lighting a tiny electric lamp inside the doll's head. The colors are shaded to appear more realistic when the light is on.

To Guard Her Ears While Having a Haircut; Metal Shield That Prevents Injuries from Scissors

EAR GUARD PREVENTS INJURIES WHILE HAVING HAIR BOBBED

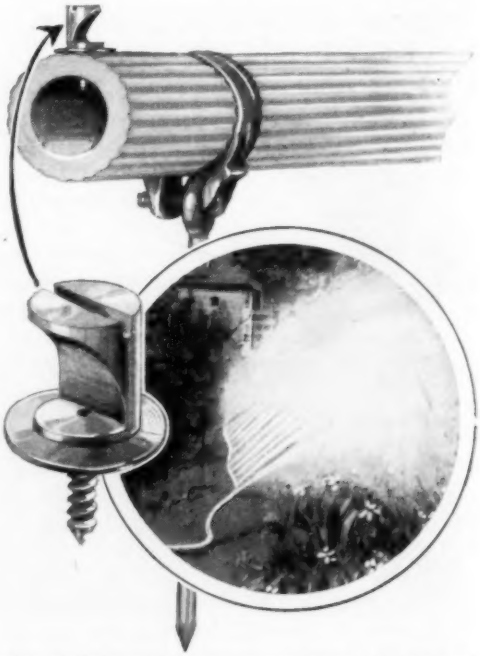
For women and children, an ear protector has been devised to be worn while in the barber's chair. It guards against cuts and burns and is perforated to admit air and sound.

MEMORY TESTS FOR SQUIRRELS SHOW HOW FOOD IS FOUND

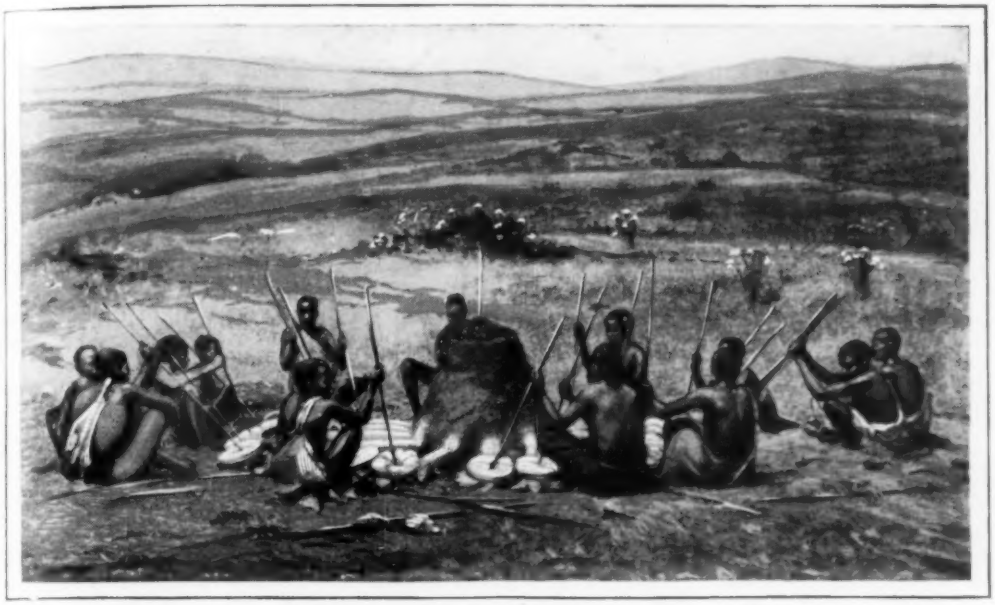
Are squirrels able to remember where they hide nuts; are they guided by the sense of smell or do they just chance to find food that they or other squirrels have hidden? Naturalists are puzzled over the question, but tests performed with a squirrel by Dr. A. Brooker Klugh, of Cornell university, indicate that memory plays no small part in the animal's remarkable skill at locating food it has secreted. A red squirrel buried nine nuts in the snow on a house balcony. The next day it came and dug them up one by one, although a new fall of snow had complicated the problem. Dr. Klugh concluded that the performance showed the squirrel's strong memory for location. Others were frequently observed taking the shortest route to something that had been stored. Another naturalist reports that a fox squirrel, fed in a shallow box on a house porch, was unable to find nuts that were completely buried in the sand, although it had no trouble in locating those that were partly exposed. This was taken to indicate that the sense of smell played only a small part in the process and that the squirrel was at a loss to find food it had not hidden itself.

SPRAY WATERING OUTFIT HELPS LAWNS AND GARDENS

Sprinkling newly planted gardens with an ordinary hose requires care, as too strong a stream of water may tear the soil. A sprinkler outfit now on the market is arranged to direct a fine, evenly distributed mist over tender plants or can be used in geyser-fashion, shooting several jets of water and covering a wide area. In a length of special hose are screwed a number of sprays which form outlets for the water and can be set at different angles. The hose is closed at one end and is held in place by brass anchor pins. The outfit may be had in short or long units, depending upon the area it is intended to serve.



Unit of Hose and Nozzle, Showing How It Is Attached, and Group of Sprinklers in Action



A Glimpse of the Iron Age as It Is Expressed in the African Wilds; a Group of Natives "Cooking" Ore in Crude Clay Furnace; Charcoal Is Used for Fuel

IRON-MAKING IN AFRICAN WILD REFLECTS EARLY PROCESS

How more highly civilized peoples have developed methods for transforming ore into metal is seen in one of the processes used by certain tribes in South Africa. The natives first fashion a plate of clay pierced with holes and bake it until it is extremely hard. Iron ore and charcoal are then placed upon the plate, a charcoal fire kindled underneath and kept burning with bellows. As the ore melts and trickles down through the holes, it passes into another clay container, where fire is blown upon it until the smelting process is complete. After this, the metal is hammered into crude tools and weapons.

WEATHER WHEEL TESTS PAINTS TO DETERMINE WEAR

Qualities of paints are determined in a relatively short time on an electrical testing arrangement somewhat like a small Ferris wheel. Panels painted with samples to be examined are attached to the circumference of the wheel which makes a complete revolution in forty-five minutes. As it turns, the surfaces pass through a spray of water and then under a mercury-vapor lamp which radiates ultraviolet rays akin to sunlight. The panel then travels in front of a bank of electric lights, where it is heated, and dipped into a tank of ice-cold water. This cycle of conditions corresponds to those which the paint would meet under actual weather changes and, in less than an hour, it is subjected to wear equivalent to long service.

LOCATOR FOR ELECTRIC WIRING SAVES TIME AND LABOR

To insure a higher quality of work with less expenditure of time and effort in installing electric boxes for outlets at the baseboard, an accurate and easily operated guide has been devised. It is attached to the top of the board by a curved lip, then tapped lightly with hammer or pliers to score the face of the wood and indicate the area which must be cut out. It is quickly adjustable to different dimensions, eliminates all guesswork and prevents cutting too large or too small apertures at wrong angles.

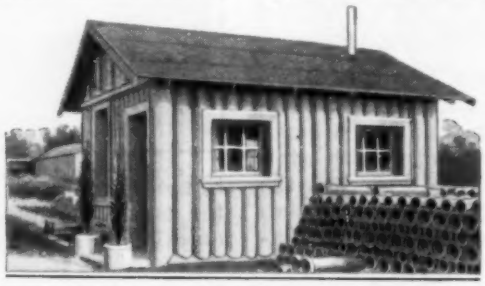
Airing Bag Being Attached to the Cleaner; the Drawing Shows How It Is Placed for Operation, Closed and as Moth-Proof Container

THINGS EASILY AIRED INDOORS WITH VACUUM CLEANER

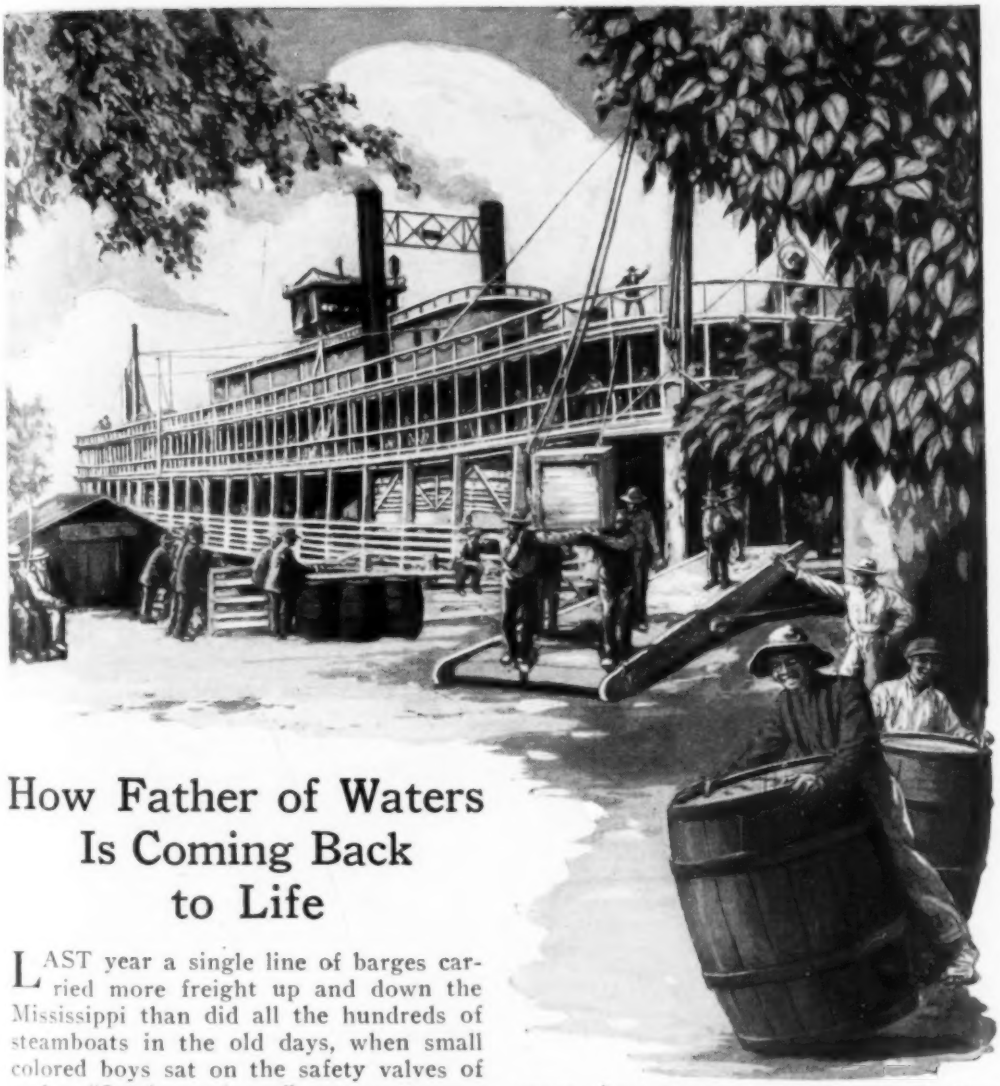
Pillows, blankets, woolens, infants' clothing and many other articles can be given a thorough airing and renovating through the use of a patented attachment for the vacuum cleaner. It is simply a sanitary bag, with a hose attachment at one end and air holes and drawstrings at the other. The articles to be aired are tucked into it, then the bag is connected to the vacuum cleaner, the airing end placed at an open window and in fifteen or twenty minutes, with the cleaner running, an effective treatment has been given the contents of the sack. This is said to be more thorough than eight hours of exposure in the usual way, and there is no risk of theft, little work and much less hazard of soiling. The bag can be connected to any vacuum cleaner provided with attachments and, when not used, makes a storage sack for various articles, protecting them against moths, dampness and dust.

OFFICE BUILT OF CEMENT PIPE

Constructed almost entirely of concrete pipe, an office building of a California company has proved such a success that use of the material is suggested for other one-story houses, such as milk-cooling quarters, storage sheds and like buildings for farms. The pipe affords protection against dampness, heat and cold, and the thick walls exclude almost all sounds. Concrete irrigation pipe, eight inches in inside diameter, was used for the sides, with ten-inch pipe at the corners. Center and corner columns were strengthened by filling them entirely with concrete and inserting reinforced steel. The first row was set six inches below the surface of the ground, eliminating a separate foundation. Roof timbers were made fast by studding them with nails, bent over and covered with cement. Joints were sealed with a rich mixture, and the spaces under the peak were boarded and stuccoed.



Office of Concrete Pipe; Shortly After Photo Was Taken, Cement Roof Was Constructed



Old-Time Plantation-Landing Scene on the Big River When the Floating Palace Paused to Deliver Freight

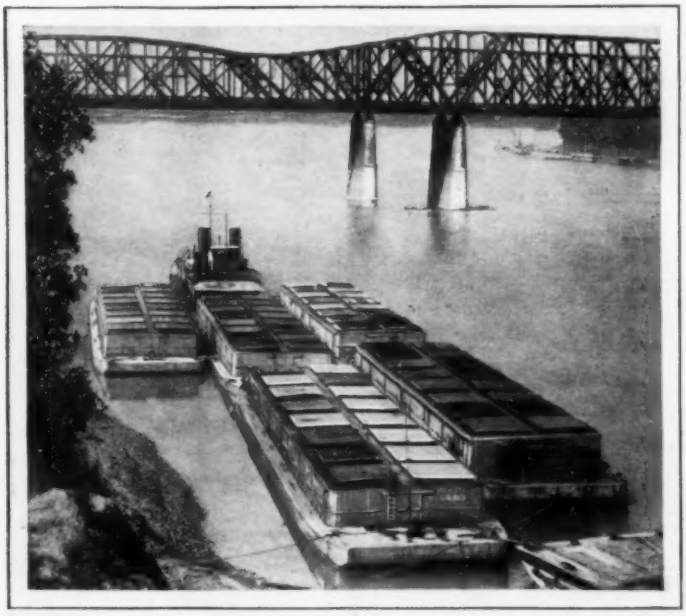
How Father of Waters Is Coming Back to Life

LAST year a single line of barges carried more freight up and down the Mississippi than did all the hundreds of steamboats in the old days, when small colored boys sat on the safety valves of racing "floating palaces," out to set new records for the run from New Orleans to St. Louis.

As river navigation had been practically dead and gone for half a century, the performance of the federal barge line, in competition with highly organized railroad service, is all the more surprising. But the "Father of Waters" has come back as a transportation factor, and not only that, but his reawakening has hardly started, and within a few years the record may be doubled or tripled.

The Civil war hastened the death of the old-time river boats, and the World war brought steamboating back. During the latter war, the government built fleets of barges and tugs to relieve the overburdened railroads in getting steel from Birmingham down the Warrior river to Mobile, and in handling cargo on the Mississippi. With the war over, and a fleet of barges on its hands, the war department conceived the idea of organizing a freight corporation and going into the business of showing that the river could compete with railroads even in times of peace.

The barge lines of the Mississippi and Warrior rivers are the result. The one plies



Modern Steamboating with Huge Steel Barges of 2,000 Tons' Capacity Each and a Single Powerful Tug to Push the Fleet

from St. Louis to the gulf, and the other from New Orleans around to Mobile and up the river to Birmingham. This year, a fleet of smaller craft is opening a feeder service on the upper river from St. Louis to St. Paul and Minneapolis, and other lines are to branch out up the Missouri and Arkansas, while the Ohio and the Cumberland are already organized by private companies.

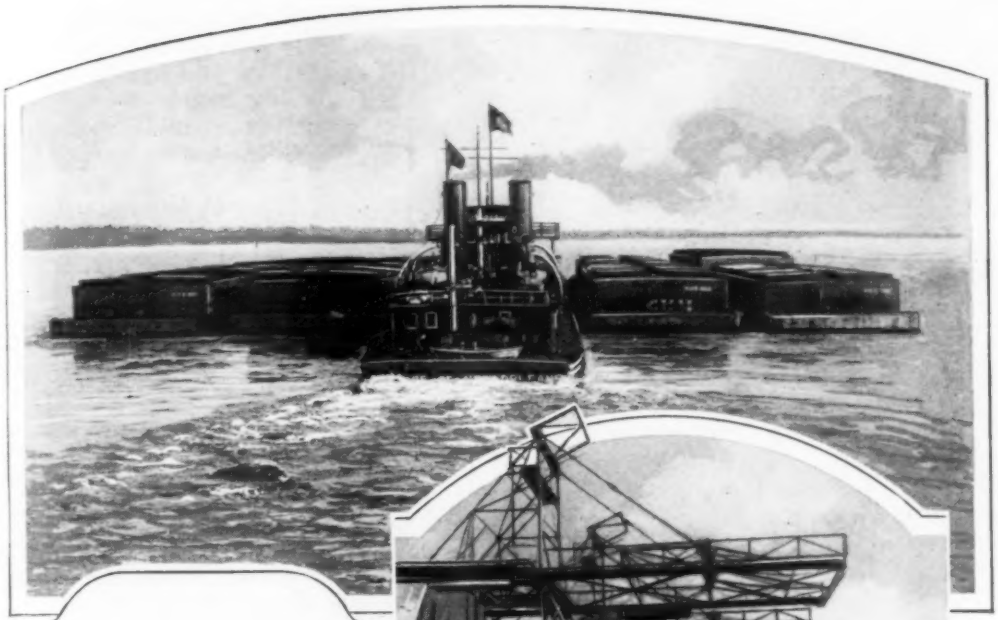
The modern river boats, though, bear no relation to the old-time river palaces, with their high tiers of decks, splashing side or stern paddle wheels, their brave show of white paint and gold leaf, and their crews of rollicking, chanting negro roustabouts, singing as they loaded a few bales of cotton or a drove of hogs at some plantation landing.

Instead there is a fleet of as many as nine huge steel barges, each of 2,000 tons' capacity, all roped together with huge steel hawsers, and the whole lot pushed up or down the river by a single highly efficient tug. The pusher—"propellers" they call them on the river to distinguish them from the side and stern-wheelers—is a shallow-draft vessel, so shallow that its propeller turns in a tunnel in the bottom of the hull, the tunnel protecting it from snags and sand bars. When the propellers first appeared on the river, the old-time rivermen scoffed, for even with the tunnel arrangement the draft was deeper than that of the paddle steamers. They expected the new-fangled boats to be piled up on sand bars and lost before the summer was over—but that was five years ago, and they are still going strong.

A typical tow down the river from St. Louis averages as much as 16,000 tons of freight. The average railroad car carries from forty to fifty tons, so it is easy to figure how many trainloads such a barge tow would make. Most of the freight is destined for trans-shipment to ocean-going boats at New Orleans, and a single load is more than enough for any seagoing freighter, for even a 10,000-ton ship at sea is a big one. Ten to twelve thousand tons is a load even for the biggest of the great lakes ore freighters, which are the most efficient big ships known.

Yet the Mississippi barges regularly handle enough freight in a single tow to fill two or three average-size tramp steamers, and carry it down a channel where the water depth is frequently nine feet or under and where one of the most treacherous streams in the world is constantly piling up new sand bars and snags and shifting the old ones. They get stuck quite frequently, for three rows of barges, lashed three abreast, make a tow some 600 feet long and 100 feet or so in width, all propelled and maneuvered by a single tug puffing along behind. But when they do hit a sand bar, the crew unlashes the barges and one by one the tug pulls them off, then re-forms its covey and plods away again.

The crews that handle such a dead weight must be skilled men and quick thinkers. Many of them have good educations and plan to stay with the river boats until they can qualify as pilots. Anyone who has read Mark Twain's story of his train-



Five Giant Barges Lashed Side by Side, and Four More Ahead, Can Be Pushed 2,000 Miles against the Current in Twelve to Fifteen Days, Including Stops at Numerous Landings and, Sometimes, on an Uncharted Sand Bar; at the Right Are the Cranes on the St. Louis Municipal Docks, Where Freight Is Sorted and Dropped into the Waiting Compartments of One of the 2,000-Ton Government Barges; Below, an Express Barge, Self-Propelled, on the Warrior River Division, Plying between Birmingham, Mobile and New Orleans

ing as a pilot, in his "Life on the Mississippi," has some idea of what the men who guide the ships down the Father of Waters must know.

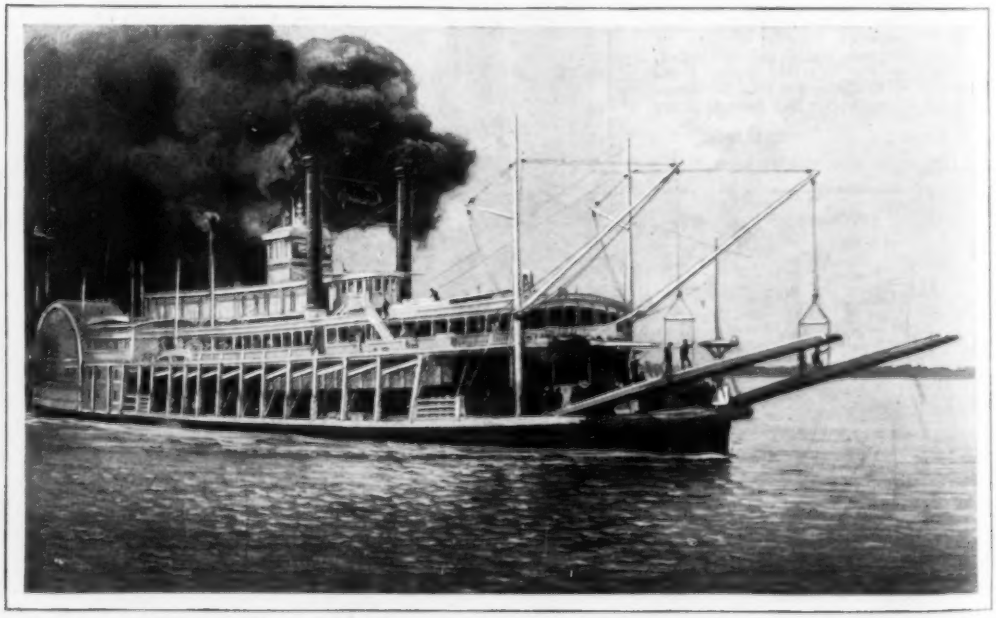
The barge service is not limited to the big tows. To supplement it, there is a faster express service, handled by self-propelled barges, and carrying any sort of small-lot shipments. In a typical manifest, for example, there are groceries from Milwaukee, shipped by rail to St. Louis, reshipped by barge there for New Orleans, where they are transferred to a steamer for passage through the Panama canal and around to Los Angeles for final delivery—at less cost than a rail trip all the way across the continent.

The privately operated ships on the Ohio, Cumberland and Monongahela bring much freight down to Cairo to be trans-shipped to the government-owned barges. The Ohio also carries big steel and coal shipments down the river. Under government plans, some fifty dams have been built in that river to maintain fixed depths all the way to Pittsburgh, the pool behind one dam backing up to the foot of the next. In times of high water, the dams, which are built in sections, are laid flat on the bottom, so that boats may have an unobstructed passage, and when the river falls, they are raised to retain the water, and ships pass through the locks.

Illinois is working on a new barge canal to connect the Illinois river with the Chicago drainage canal, and so with Lake Michigan. Locks as big as those at Panama are being built, and the federal government has been authorized by congress to dredge the Illinois river itself to open a nine-foot channel from the great lakes to the Mississippi. The locks built by the state at Starved Rock, Marseilles, Brandon Road and Lockport will be big enough to accommodate a nine-barge tow at one time, and at least one will have a higher lift than any lock in the Panama canal.

PINS KILL MORE CHILDREN THAN GUNS

The safety pin has claimed more children's lives than have guns, in the opinion of an eastern physician, who declares that the bad example, set by the mother in holding pins in her mouth while dressing the child, is responsible for many of the disastrous results of babies swallowing things. He has devised a special apparatus for the removal of safety pins from the child's stomach. With the aid of a small tube, electric lighted at one end and



The Type of River Boat Made Famous by the Race of the "Robert E. Lee" against the "Natchez," in the Days When Pine Faggots Fed the Furnace, While Small Boys Sat on the Safety Valves

with holes for breathing, he can look into the organ and with the help of forceps, safety-pin closers or other instruments, shut the pin and so simplify its extraction. Such a tube, of the size that can be used for a baby, is hardly larger than a straw.

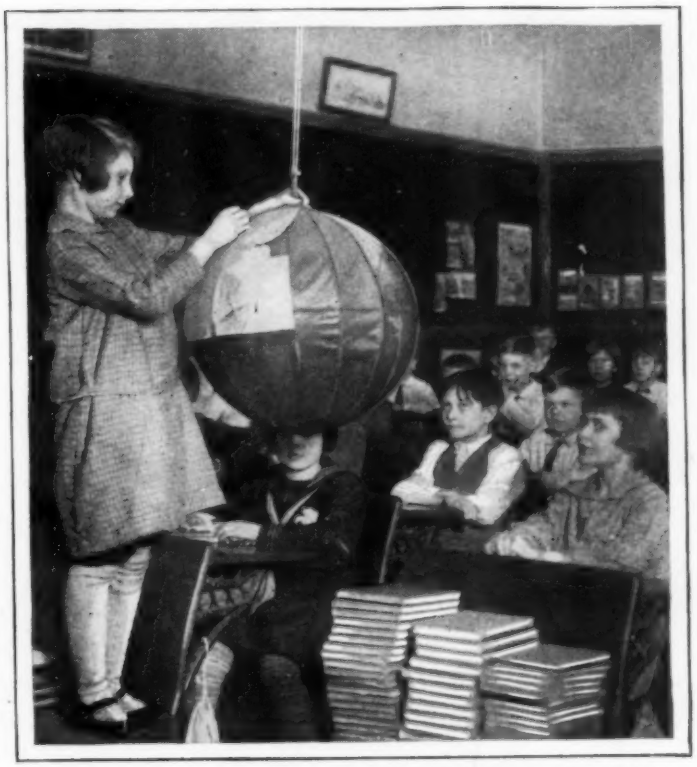
WHERE WAX IS MINED

In various parts of the world there are mines for obtaining a curious resinous substance, a mineral wax which is used as a base, with other materials, in the manufacture of wax candles, phonograph records and like articles. Deposits are often found in conjunction with rock, salt and coal, and while traces are discovered in Austria, Russia, Roumania, Egypt, Canada and Mexico, it has so far been profitably mined only from an island off the west coast of the Caspian sea. One of the hazards of the work is that the soft wax is sometimes forced into the shafts where men are engaged, due to the great pressure to which it is exposed.

GUARD DROPPED OVER WHEELS PROTECTS PEDESTRIAN

So that the wheels may not pass over a person or animal struck by the automobile, a guard is attached under the front fender on both sides of the car. It can be dropped by a driver's control or made to fall automatically in case the mudguard is struck by a person or inanimate object.

Guards Lowered to Prevent Running over a Person

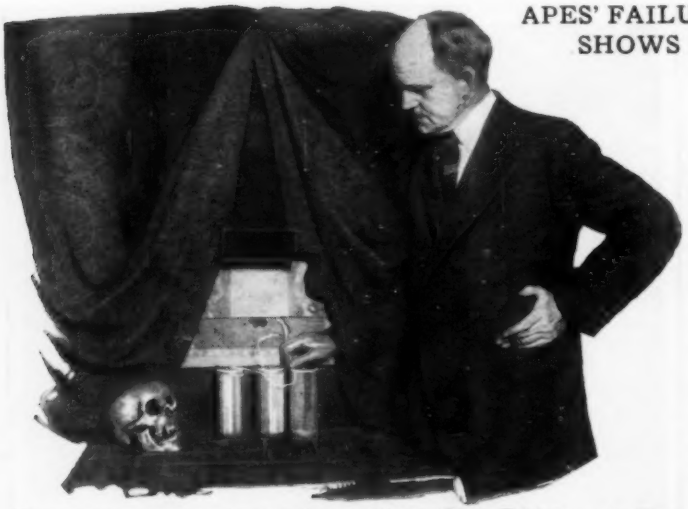


Pasting Maps on the Globe, a Pleasant Geography Lesson; When Not in Use, the Sphere Is Drawn Up to the Ceiling

PUPILS MAKE THEIR OWN GLOBE AS GEOGRAPHY AID

To help pupils of a Cincinnati school gain a clear idea of the location of the different countries, their geography teacher has them fashion their own globe on a wire frame covered with cloth. The sphere is suspended from the ceiling of the classroom by a rope and pulley. After maps have been drawn and studied, those of the right scale are pasted upon the globe and in a few weeks, the entire world is there.

¶Names and addresses of manufacturers of articles described in this magazine will be furnished free by our Bureau of Information.



Demonstrating the Lighting Equipment Which "Plays Tricks" on the Eyes, Causing Things to Disappear

THINGS ARE MADE INVISIBLE BY COLORED RAYS

By the use of cleverly controlled rays of colored lights and a refraction screen, a Washington artist is able to make things invisible. At a demonstration, a person sitting in a chair was suddenly "dissolved from sight" while the chair remained. According to reports, the late Houdini was to have employed this system in causing an entire audience to disappear. The "magic" of the stunt is based on certain laws of light and vision, and emphasizes the fact that our eyes are dependent upon light rays for what they see.

EYE-REST GREEN AIDS SURGERY

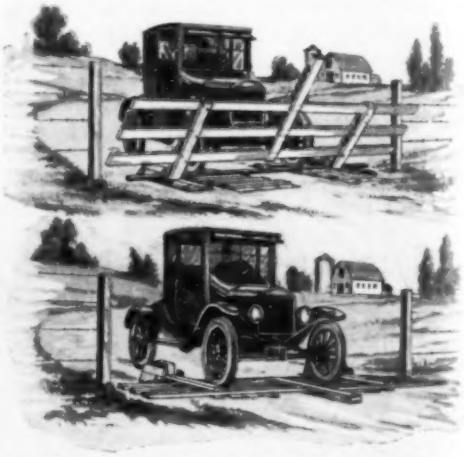
Color as an aid to surgery has been given additional recognition as the result of research work by an eastern physician who has found that a shade of bluish-green for the operating room is best where subdued illumination is important to prevent glare and protect the eyes of the surgeon. The particular shade has been called "eye-rest green" and already has been prepared by chemists. One reason why it was chosen is that it proved to be the correct complement to the color of blood when exposed to air. In the opinion of the physician, table, gowns, toweling and draperies used in the room should be of the deepest tint of the special green.

APES' FAILURE TO LEARN WORDS SHOWS IMITATION LIMIT

Apes have a strong tendency to imitate what they see, but apparently little urge to duplicate what they hear, and in this lies one of the chief reasons why scientists have been unable to teach the animals how to talk, Dr. Robert M. Yerkes, of Yale university, believes. A chimpanzee might be instructed to talk with its fingers, after the manner of deaf persons, more easily than it could be made to imitate the sounds of human speech. Dr. Yerkes holds that the sounds made by apes are not a language at all, but, primarily, emotional expressions of fear, anger or other emotions, which are not learned by imitation.

GATE OPENED BY AUTO BUMPER CLOSES ITSELF

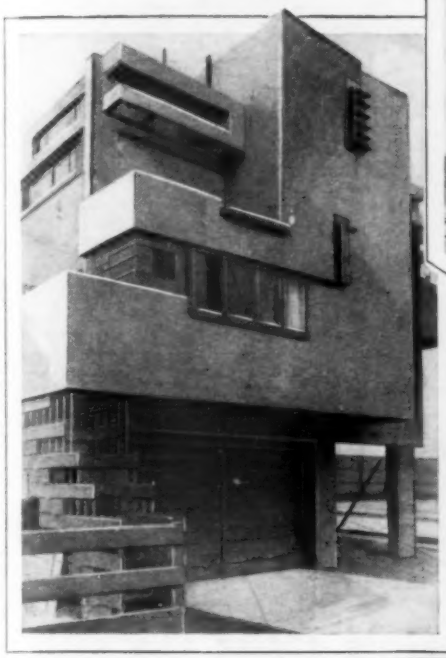
Mounted on weighted pivots, a farm gate devised by a western inventor is easily pushed open by the automobile and closes of its own accord, when the vehicle has passed. An extension in the center holds the gate down, until the car has proceeded far enough to prevent scraping the rear when the gate rises.



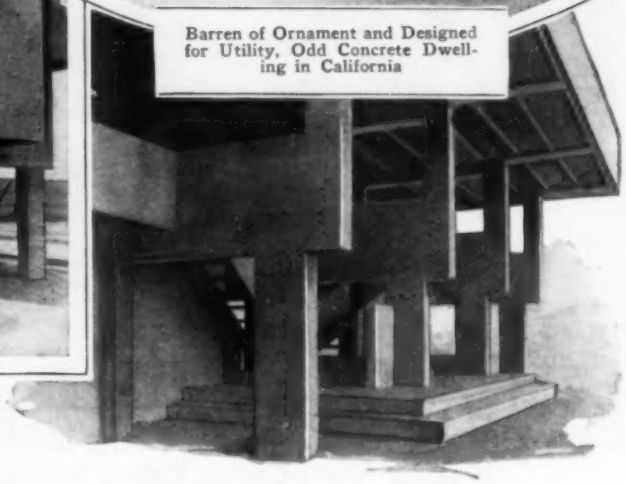
Self-Closing Gate in Use; It Swings Back Upright After Auto Has Passed

UNUSUAL HOME IS BUILT OF CONCRETE AND GLASS

An unusual home has just been completed at Newport Beach in southern California. The massive



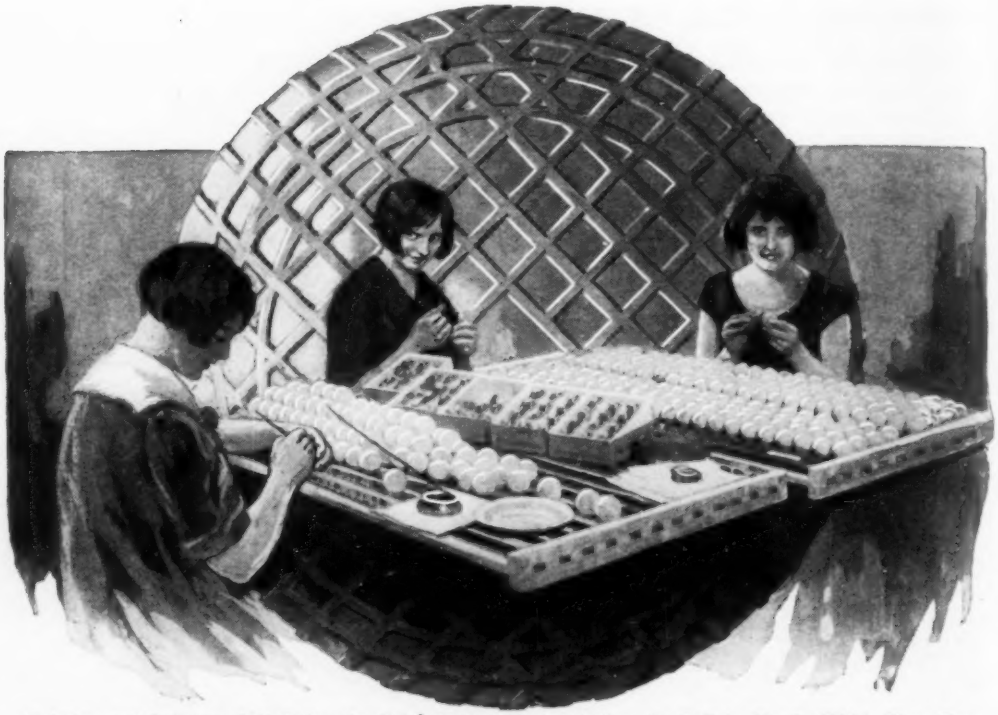
Barren of Ornament and Designed for Utility, Odd Concrete Dwelling in California



reinforced-concrete columns were constructed first, while the interlacing of concrete walls, floors, and great glass windows served to connect the whole structure into a single unit. All the walls are of solid concrete, nearly four inches thick, and there is no exterior or interior finish aside from the usual cement surfacing. Huge plate-glass windows afford an abundance of light as well as beauty. In planning this building, the architect endeavored to use his materials in as natural a way as possible. All ornamentations, curved forms, and decorations were carefully avoided, and an entirely different conception in building has been the result. The structure as a whole will be perfectly balanced. The furniture, lighting fixtures, doors, fireplace, and other parts of the interior, are carried out in the same angular construction. One piece of furniture includes several cloak closets, a long lounge with book and magazine racks on one side and on the other a place for the dinner table and cupboard shelves for use when serving. Every corner is utilized for some specific purpose.

AIR CHAMBER IN SURFBOARD MAKES IT UNSINKABLE

A surfboard that cannot be sunk, because its upper and lower decks inclose an air chamber, offers new thrills for swimmers. As the boat will support 150 pounds when at rest and considerably more when under way, even an ordinary outboard-motor boat is sufficient to tow it with a rider. The upper deck is concave and the lower one convex. A brass drain valve is provided to keep the air chamber dry. Although nearly seven feet long and over two feet wide, the board does not weigh more than forty pounds.



Painting and Labeling Golf Balls; the Paint Is Put On by Rolling the Ball in Hands Which Have Been Smeared with the White Preparation, No Brushes Being Used in the Process

Where Millions of Golf Balls Go

United States, Which Furnished the Modern Rubber-Core Ball and Newest Type Clubs, Leads World in Playing Golf

FROM the day in 1491 (the year before Columbus put America on the map) when an angry Scottish king issued a ban against "golfe or uther sik unprofitabill sportis," to the recent announcement that a few of the larger American cities alone would use a million golf balls a week this summer, is a far cry. But in the last dozen or so years of those five and a fraction centuries the "Royal and Ancient" game has become as Americanized as the second generation flapper daughter of a European immigrant.

To use up a million balls a week requires an army of golfers, for the modern rubber-core ball, which is a distinctly American contribution to the pastime, is good for about five games—if not sliced into the rough and never recovered. New York, manufacturers estimate, will need 200,000 balls weekly, Chicago, Boston and Philadelphia 150,000 each and Detroit will take another 100,000—a total of three-quarters of a million for those five cities alone.

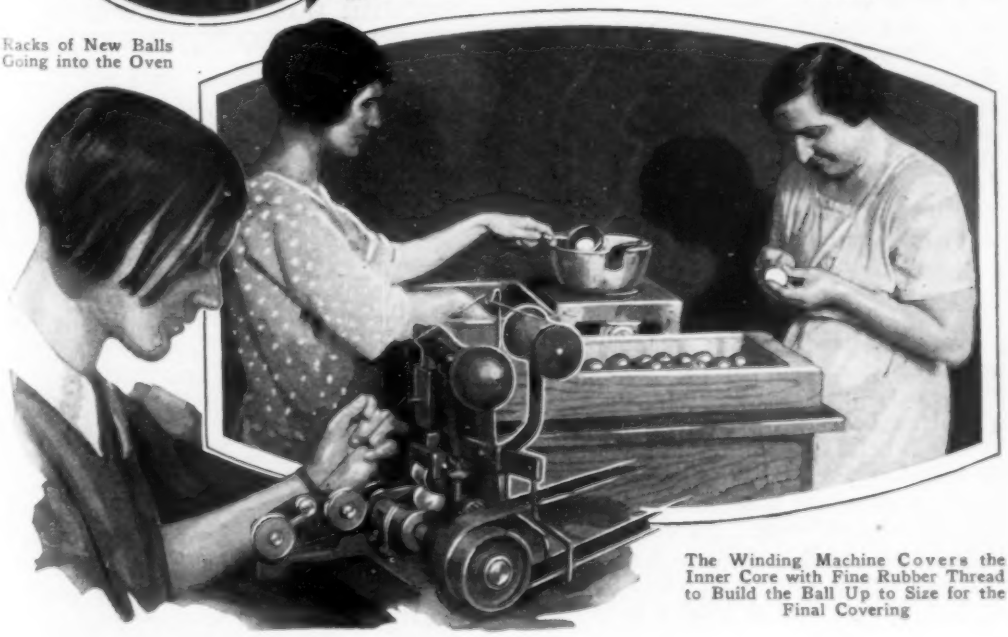
Not all of the million will be a total loss when their short life is lived, for the business of making balls has reached such proportions and uses such a vast amount of raw material that a profitable industry has sprung up to rebuild the worn-out spheres. The heart of pure rubber may be knocked out of shape, but it is as good when the ball is discarded as when new, and can always be remolded to form a new core.

Besides furnishing the rubber-cored ball, America has also contributed the steel-shafted club, improved heads, and, of course, a number of winners of the British Open and British Amateur. The core ball, which replaced balls of solid rubber, was the most important, however, for it not only lasts longer, thereby lessening the expense of golfing, but it is easier on the club heads.

Golf-Ball Covers, Before They Are Applied, Look like Pancakes; Two Are Placed on Each Ball, Which Then Goes into a Mold to Be Compressed for the Baking Process

Racks of New Balls Going into the Oven

The Test of a Ball's Value Is the Rebound



The Winding Machine Covers the Inner Core with Fine Rubber Thread to Build the Ball Up to Size for the Final Covering

Tractor Rigged to Run Small Sorghum Mill; Wheels Were Adjusted to Describe the Right-Sized Circle about the Press, and After Motor Was Started, Tractor Needed No Attention

USE TRACTOR AS POWER PLANT AT SORGHUM MILL

Where only small amounts of sorghum are raised for home use, large mills and refineries are not practical, so many growers have constructed horse-drawn units to crush the cane. An effective substitute for this plan was employed by an Iowa farmer, who made use of his tractor during its idle season. He adjusted the front wheels to describe a circle of the right diameter about the mill, fixed the steering wheel in place with a chain and let the tractor pull the crusher instead of horses. A driver was not necessary.

MAY LENGTHEN LIFE SPAN

Use of a new mercury compound may result in lengthening the span of human life twenty-five years or more, an eastern physician believes. It is said to be the most powerful substance of its kind known to chemistry, and may be developed as a possible cure for tuberculosis, influenza and blood poisoning. Its efficiency lies in its power to kill bacteria, and, at present, it is too strong for the blood system of a human being. Great strides have been made in the last few years in developing gold, mercury and arsenic compounds for the prevention and cure of diseases, and while some are in the experimental stage, remarkable results have been obtained.

CRACKER FOR BLACK WALNUTS PREVENTS CRUSHING KERNEL

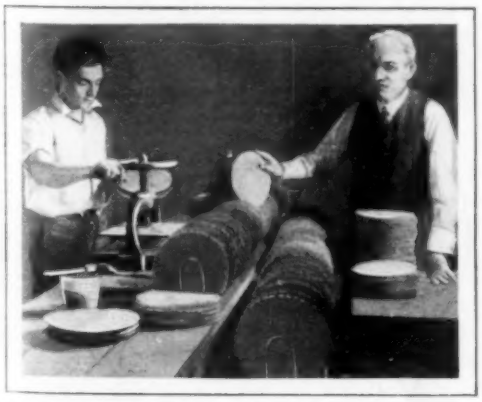
One person can crack from 500 to 700 black walnuts an hour, it is said, with a strong cracker that produces the kernels in large, easily removed pieces instead of crushing them. It also keeps bits of shell and dirt from the meat and will yield a pound more kernels to the bushel of nuts than an ordinary cracker, the manufacturers declare. It may be used for other nuts, but is specially adapted to the tough walnut and is intended to stimulate interest in raising and gathering this crop.

GLASS AGE TO FOLLOW STEEL SCIENTISTS PREDICT

From the stone age, civilization has passed through various "ages" down to the present, which is marked by the predominance of steel. In the opinion of some investigators, another substance is threatening the position of the metal. That is glass, one of the most fragile of all and, until recently, used chiefly for decoration and illumination. Modern research has developed new qualities in glass, making it far more useful. A kind prepared at Sheffield university has enormous heat-resisting powers so that water may be boiled in a heavy glass pot over a gas burner without danger of breaking the container. In making tea, for instance, this would be a great convenience as no other kettle would have to be employed. Another grade is so hard that it can be struck tremendous blows with a hammer and will not break, while still another variety can be plunged alternately into cold and boiling water without any sign of a crack appearing. The material has already been suggested for building purposes.

PAD WALLS WITH PAPER DISKS TO STOP ECHOES

Wire-covered paper "sound traps" have been devised by an eastern inventor as a means of ridding building interiors of echoes that mar the acoustics. They can be applied to walls while the structure is being erected or to those already built. The disks are hollow and covered with wires so that they will not lose shape.



Preparing the Sound-Absorbing Disks for Improving Acoustics; They Are Paper Pads Covered with Wire

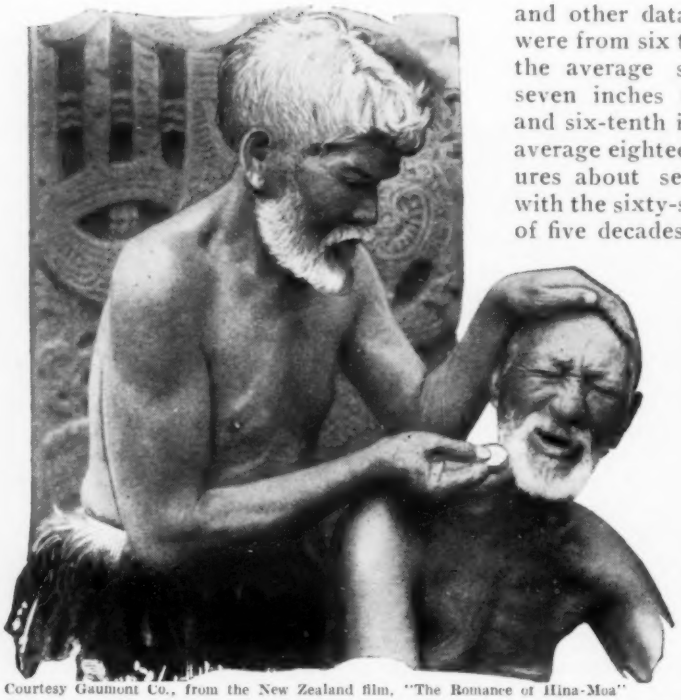
Steeple Minus Its Church; Landmark near Delsbo, Sweden, Illustrates Type of Native Architecture

OLD STEEPLE WITHOUT CHURCH UNIQUE SWEDISH LANDMARK

Churches with steeples are common enough but one of the interesting sights tourists are shown near Delsbo, Sweden, is an old-fashioned steeple minus the rest of the structure and set in a field as a landmark. It is well preserved in spite of the storms of many years and is considered a typical example of the characteristic belfry of the country-church architecture peculiar to Sweden.

LIGHT FLOATS IN MERCURY

To keep it steadier during the boat's movements, a signal lamp on a lightship at the port of Havre is floated in a mercury bath, held in the usual compass-type support. It illuminates the whole horizon.



Courtesy Gaumont Co., from the New Zealand film, "The Romance of Hina-Moa"

Before the Days of "Luxurious" Shaves; a Maori Barber and Victim, Demonstrating How Sharp Flints Were Used to Remove Beards

SHARP FLINTS USED FOR RAZOR AS IN STONE AGE

Maori barbers in New Zealand demonstrated their skill at an ancient shaving custom for a motion-picture film recently. For a razor, two sharp pieces of flint were used, while the "customer" plainly registered the fact that the operation was more of an ordeal than a pleasure. The practice of shaving with flints is said to have had its origin in the Stone age, more than 20,000 years ago, and was popular, even if painful, for many centuries and among various peoples. In the British museum are specimens of flints with which the Romans shaved in the classical age.

AVERAGE BOY IS TALLER TODAY THAN FIFTY YEARS AGO

According to research and measurements prepared by a Chicago physician, the average American boy of today is more than three inches taller than the lad of corresponding age fifty years ago. Figures obtained for the present generation were compared with those gathered from school and other data, and the boys considered were from six to sixteen years old. Today, the average sixteen-year boy is forty-seven inches tall as against forty-three and six-tenth inches fifty years ago. The average eighteen-year-old boy today measures about seventy inches as compared with the sixty-seven-inch height of the boy of five decades ago. The factors responsible for the difference, in the opinion of the doctor, are better means of preventing diseases, knowledge of vitamines and the value of sunlight.

VALUE OF HUMAN LIFE

Every person in the United States has a value of $17,500, according to estimates by the American statistical association. The total valuation of human life in this country is placed at $2,000,000,000,000, on the basis of the population, present national wealth and the probable earning power of individuals. The wealth-producing capacity of the average American is set at twenty to twenty-five times his annual income, and it is believed five times the aggregate of the country's wealth at the present time will be produced in the estimated period during which now effective human energies will continue to be applied.

ADDING PENCIL IS ACCURATE AND SAVES TIME

Double service is afforded from a refillable pencil that has an adding device at the upper end. It is easy to operate, and accurate and rapid when the few simple instructions have been learned. The adding mechanism is made of metal.

Rescue Work Saves Fish

Gathering Fish from Stagnant Pools in Arkansas, Where Millions Are Saved by Moving Them to Fresh Water; Spring Floods Wash the Fish into Sloughs, Which Later Become Dry

By TOM SHIRAS

UNTIL rescue work was started several years ago by the Arkansas fish and game commission, hundreds of thousands of fish died annually in the summer, when the shallow lakes and slashes in the timbered lowlands of the state went dry.

A scorching-hot sun, water lines of every slough and shallow lake receding; water hot, brackish, with a thick green scum on the surface, and thousands of fish milling around seeking living water, then dying —these were the conditions the commission found.

During periods of high water, the rivers that flow out of the Ozark mountains, in the north part of the state, through the bottoms, overflow and when the water recedes, every depression is left full. The fish go in with the flood, spawn, and both the adults and fingerlings are trapped when the hot days of summer come.

The gear used in fish-rescue work consists of seines, ten-gallon cans in which to transport the fish, and hardening plants. The latter are used to restore vitality, and harden the flesh which has been made soft by the stagnant hot water.

The hardening process is necessary. Without going through the treatment, the fish would die in a short time. The equipment in these plants is very simple, consisting of a small gasoline engine, a pumping jack, four wooden barrels, eighteen tubs, and two pieces of ordinary one-inch pipe, with one-eighth inch spray holes bored every two feet. The plant is set up under temporary shelter, at a good well of fresh water as close as possible to the area in which the work is being carried on.

The barrels are connected with short pieces of hose, are set on a platform, about five feet high, at the front end of the plant, and the water from the well is pumped directly into them. The two pieces of one-inch pipe with the spray holes are connected to the barrels and laid on a rack down the center of the plant, the tubs being lined up beneath them, nine on

Fish-Hardening Plant in Operation; the Tubs Are Started with Warm Water, Which Is Gradually Lowered in Temperature Until the Fish Are Restored to Full Vitality

each side and each tub directly under one of the spray holes in the pipe. The overflow from each tub passes out through a screened hole in the side near the top, and runs off on the ground. When the fish become lively, screened frames are put over the tops of the tubs to hold them.

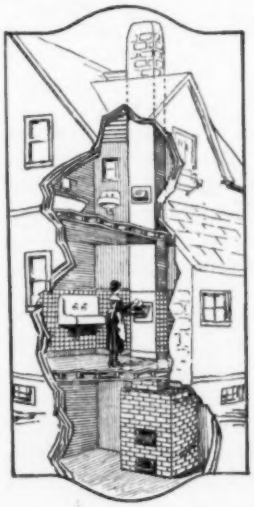
In preparing the plant to handle a batch of fish, the barrels and tubs are filled with water and allowed to stand until the temperature is raised to the same degree as that of the hot, stagnant water from which the fish were rescued. The water has to be tempered to avoid gill congestion, which is caused when fish with low vitality are plunged into water colder than that from which they were taken.

When everything is ready, the seines are put to work, and the fish are rushed to the plant and placed in the tubs. The pump is started and the flow of water through the plant starts, continuing very slowly, so that the temperature of the water is lowered gradually. As soon as the proper temperature is reached, the full flow of the water is turned on, and is kept running constantly for from twenty-four to thirty-six hours.

Water used in hardening fish must be pure, and, particularly, free from iron. The commission has had some sad experience in using water containing this mineral, and every well now is tested before a plant is set up. As fast as the fish are hardened, they are placed in cans, and either hauled by truck or shipped by express to different points in the state where they are planted in living streams.

CHIMNEY-FED INCINERATOR HAS MANY ADVANTAGES

Dump your rubbish down a chimney and forget it. Such a convenience, with the additional requirement of an occasional match set to the pile and removal of unconsumed materials every few months, is now possible in a built-in incinerator that replaces the unsanitary garbage can and is much simpler to use than other burners which require a special trip to the basement whenever refuse is to be deposited. The chimney is constructed at the time the house is erected and is so arranged that there is said to be a minimum of smoke and gases during burnings, and thorough



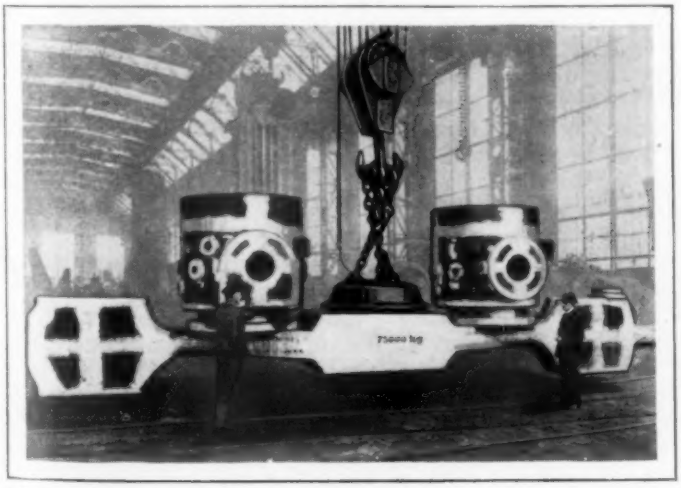
combustion is assured. As the fire is at the top of the material, the heat liberates gases from below and these pass up through the flames where there is a plentiful supply of oxygen. No commercial fuel is necessary to operate the incinerator. By destroying stuff that often is allowed to accumulate in the basement, it is a great aid to cleanliness and safety.

HEAVIEST STAR IN UNIVERSE WEIGHED AT OBSERVATORY

What astronomers believe to be the mightiest mass of matter known to man has just been weighed at the Yerkes observatory. It is star "27" of the Great Dog constellation and weighs 300 times as much as the sun. Its gravitational force is so great that if Babe Ruth attempted to hit a home run there with an ordinary bat, the ball would be pulled to the ground before it had traveled a foot. Ruth himself, standing on the surface of the star, would weigh sixty tons and, with merely human muscles, he would be unable to lift a bat or his own right hand.

GIANT MAGNET EASILY RAISES SEVENTY-FIVE TONS

Work that would require many men is performed quickly and easily with a huge magnet in the Krupp works at Essen. It is nearly five feet in diameter and is capable of lifting seventy-five tons.



Lifting a Huge Steel Unit with Five-Foot Magnet, Seen in Center; It Saves Time of Adjusting Cables

FOREST-FIRE EXTINGUISHER WORN LIKE KNAPSACK

Knapsack Fire-Fighting Outfit for Forest Rangers; It Throws a Stream Nearly Thirty Feet

Putting out the forest fire while it is in the early stages is the object of alert rangers, and one of the special units to aid in this is an extinguisher which is strapped on the back like a knapsack. It is said to be capable of throwing a small stream from twenty to thirty feet, the galvanized-iron tank holds five gallons, and the hose is six feet long. The force pump attached is operated by the person carrying the extinguisher. The outfit is considered especially suited to the needs of the rangers who often discover small fires started by careless campers and picnickers. Most of these fires occur near small streams, so that a water supply is usually available for operating the extinguisher.

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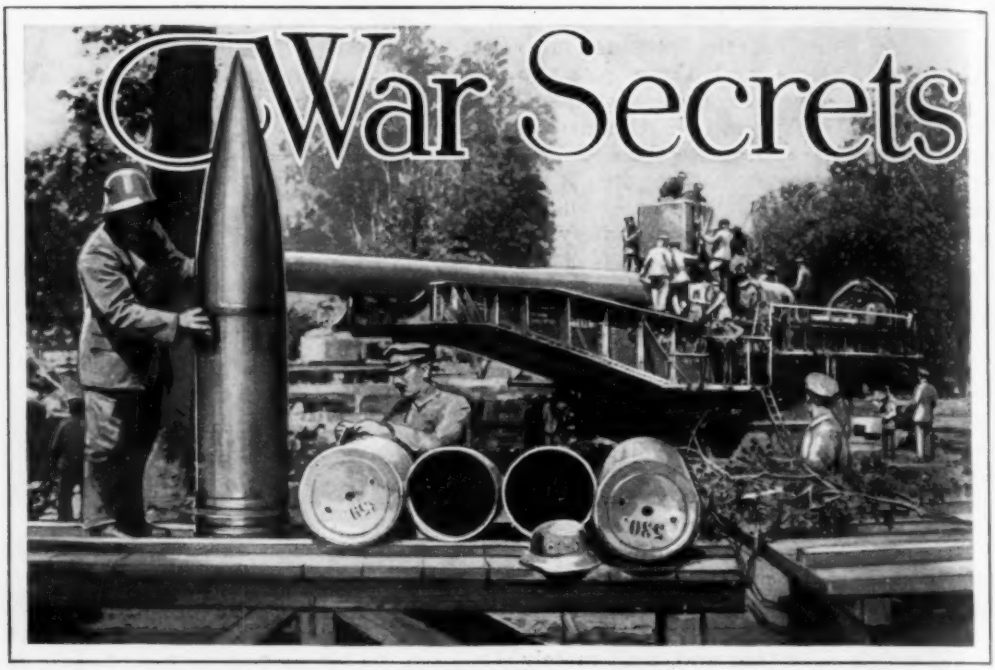
War Secrets



"Big Bertha," the Long-Range Gun That Shelled Paris from a Distance of Seventy-Five Miles, and a Gunner beside One of the Sharply Pointed Mammoth Shells Used in the Cannon

By HAROLD T. WILKINS

THIS is the story of the tin fish and its brother, the metal tadpole; of the rubber eel and the porpoise ears, the sea buoy that concealed a cannon and its crew, the panic parties of the strange Q-boats, and some of the other secrets of the great war which now can be told.

Although it is more than eight years since the conflict ended, the carefully guarded secrets are just emerging, particularly that of "Big Bertha," the long-range gun that shelled Paris. When the advancing allied armies reached the forest of St. Gobain, where "Big Bertha" had her lair, they found only the wreckage left by the Germans, who destroyed the cannon when they found it was too big to move. Photographs of the wreck were taken, but until several pictures were smuggled out of Germany recently, the rest of the world did not know what the gun looked like in action.

Big Bertha was designed to break down the morale of the defenders of Paris. When the German drive on the French capital started and pushed forward toward the Marne, only forty miles from the city, the long-range gun opened fire. The German idea was that the French would think the enemy had broken through the front and was almost at the city's gates, therefore the defenders were supposed to abandon everything and flee the city.

The upset to the German calculations came when the first shell dropped out of the sky and plunged through the roof of a church. The French were sure the line had not broken, and no one could conceive of a gun firing on Paris from behind the German lines; so, it was assumed the explosion was caused by a bomb dropped from an airplane, and before the truth was learned Paris had become inured to being shelled.

The big gun was an enormously costly failure, interesting in an abstract way because of the problems its operation involved, but of no practical value. The pictures recently obtained show the gun was fired at an elevation of forty-five degrees, so that the shell, rising in an enormous arc, quickly would pass through the layer of five or six miles of denser air at the earth's surface and emerge into the

Revealed

rarefied atmosphere where it would meet with less resistance in its flight. Experts calculate that to hit in the neighborhood of a chosen mark it was necessary to aim the gun, in the latitude in which it was used, about a mile to one side to compensate for the rotation of the earth.

The German engineers were exceptionally clever in developing their weapons, from big guns to airships and submarines, but the defensive measures produced by allied inventors were equally shrewd. Fortunes were spent in developing U-boats which could slip along under the surface and release mines that automatically rose to a certain distance from the surface while anchor cables dropped to the bottom. But a British naval officer countered with the "tin fish" that sought out the mines, snapped the anchor cables and let them come to the surface, to be blown up by gun fire.

A Rare Photograph of "Big Bertha" Being Fired; Note the High Angle to Send the Shell Miles above the Earth

The tin fish, as the sailors called it, was officially named the paravane. Like its companion, the metal tadpole and the rubber eel, it was based on the principles applied in making the fancifully painted little tin fish used as artificial fishing bait, and it was from that resemblance that it got its name. The inventor had trolled for fish on Swiss lakes and got the idea from the tin lures he used. In operation, a pair of paravanes, towed at the end of long cables from either side of a mine sweeper, plowed along well under the surface until the leading cable met the anchor line of a mine. The anchor wire slipped along the cable until it reached the paravane, when, if it had not already been exploded by contact, a powerful cutter snipped it through and let the mine come to the surface.

The tadpole was an added improvement. Towed from the bow of the mine sweeper, the paravane cable led back in a long slant, so that much of it was above the level of the hidden mines. The tadpole then was attached near the ship, and was so designed that, when it was pulled forward, it automatically descended to a certain depth and remained there.

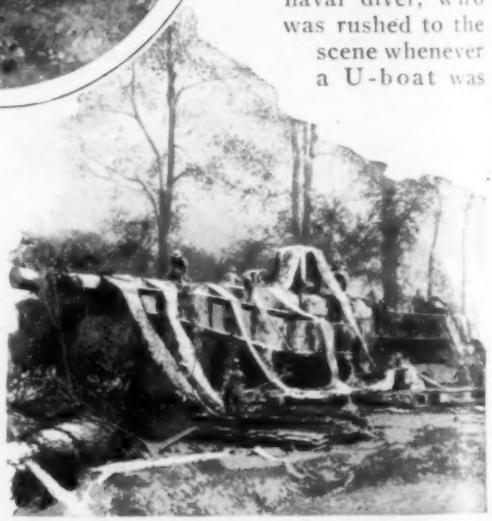
More brains were concentrated on beating the submarine menace than any single problem of the war, and time and again they were aided by the carelessness of the U-boat commanders themselves. The safe

German Field Radio with Power Developed by a Tandem - Bicycle - Driven Generator, and, at Right, an Electrical Device for Locating Buried Shells

landing of the American army in France was largely due to the habit of the submarine commanders of coming to the surface at night to run up their wireless aerials and talk with each other, report to wireless stations at home, and josh the French land-station operators. What the Germans did not know was that the allies had perfected radio direction-finding stations, working with loop aerials, and were able to determine the exact direction from which any radio signal heard was coming. A half dozen of these stations scattered around the British and Irish coasts and in France insured getting bearings from at least two on every German radio report —and only two are needed to fix not only the direction, but, from the point where the two lines cross on the chart, the exact position of the sending set.

Night after night every submarine lurking in the area between Ireland and France and Spain, where all the ship lanes of the world converge to enter the English channel, would give itself away to the listening allied operators, its position would be charted and the information rushed to the American naval headquarters at Brest, where Admiral Wilson was in command. Plotted on the charts, the reports quickly showed that the U-boats lurked in a rectangle about 400 miles off shore, with gaps to the eastward along the French coast and to the south off the coast of Spain. They never went outside that area except when en route to the Azores or to enter the Mediterranean.

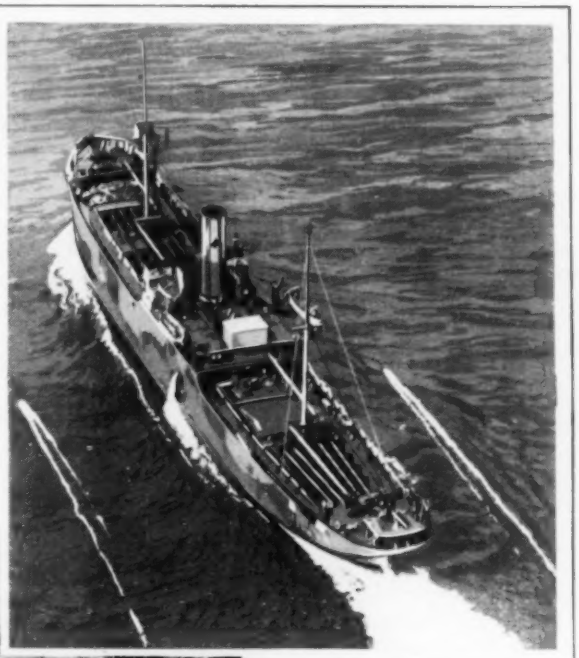
One of the puzzles of the war, from the German side, was how the allies knew so much about their submarine movements and also their mine fields. Frequently, within a few hours after a mine field had been laid, English sweepers would be on the scene busy clearing it away, and all shipping would be warned of its exact limits. The answer to the mystery was the work of a single British naval diver, who was rushed to the scene whenever a U-boat was



"Big Bertha" with Barrel Lowered and Covered with Camouflage, to Deceive Prying Airmen; from Above the Seemingly Carelessly Placed Strings Blend Completely into the Surroundings

reported destroyed. He would descend to the wreck, enter and not only recover the submarine's log, giving an accurate report on what it had been doing, particularly if it had been laying mines, but also salvage the latest German naval-code books from each wreck, so that the allies were constantly posted on enemy codes and could intercept and interpret the radio messages between submarines and land.

The diver, whose work was shrouded in the greatest secrecy, also kept the admiralty posted on new things in U-boat design and furnished tips that could be incorporated into allied submarines. He was kept fairly well supplied with boats to explore, for while the U-boats, because of their numbers, took a heavy toll of shipping, yet, because of the defensive measures developed by allied inventors, they, in turn, paid heavily for their work. And that recalls the rubber eel, the porpoise and several other inventions, all of which were used to locate submarines long before even their periscopes showed.



A Paravane and a Ship Towing a Pair of Them, Showing the White Streaks They Made as They Plowed Along under the Water

Elias Ries, an American inventor, gave the allies their first submarine sound detector, capable of picking up sounds reflected by the hull of the U-boat and showing the direction from which the sound reflection came. It was a development of a device that grew out of the "Titantic" disaster, and was conceived to enable liners traveling the North Atlantic to locate icebergs by reflected sound, or underwater echoes. For war use, the idea was improved by sending out vibrations of such a high frequency that they were inaudible to the Germans, while the reflected sound was transformed down to an audible pitch for the listener. The rubber eel and the porpoise were sound detectors towed astern, to keep them away from engine rumble in the ship. They worked on a different principle, with delicate microphones that picked up the engine vibrations of distant submarines.

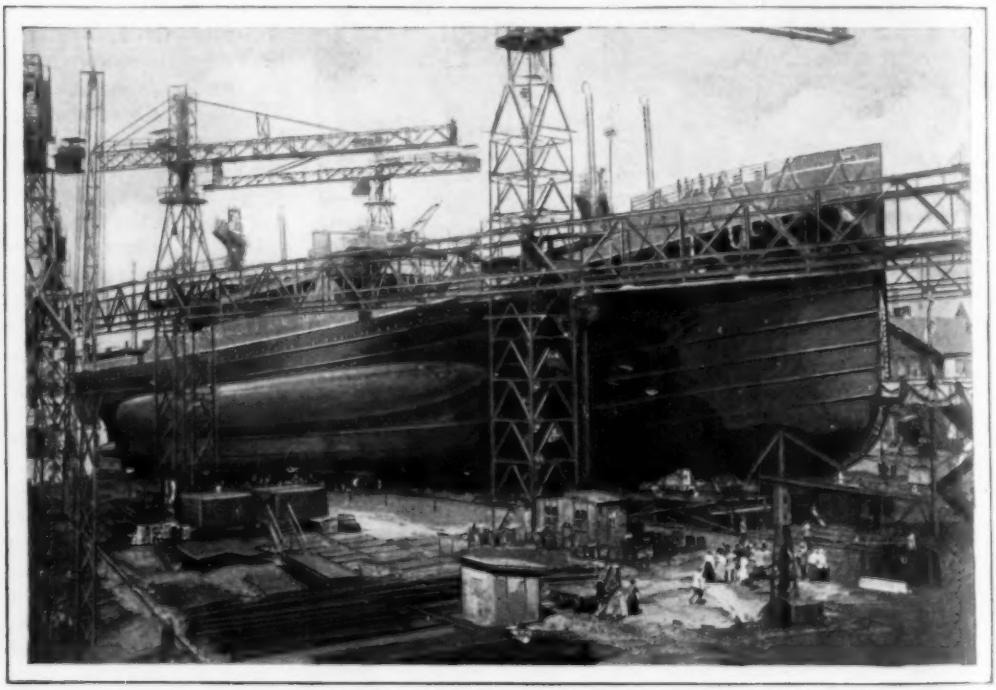
When the armistice came, the allies were ready to open up a whole bag of tricks. For one thing the American army had Lewisite, more deadly than any gas used in the war, and the British had a somewhat similar compound invented by Prof. Harold Maxwell Lefroy—a gas so insidious that if it were dropped on a city the inhabitants would be unable to detect it until they dropped dying with burned

up lungs. Nothing but a house fly has been found that can resist it. Also American inventors had developed the radio-controlled submarine, a practical aerial torpedo, to be launched from flying machines, diphenylchlorasine, a sneezing gas worse than anything used in the war, an armored triplane mounting eight machine guns, a small cannon, and dropping 3,000-pound bombs; illuminating projectiles that would light up vast areas, and a liquid poison, three drops of which were fatal.

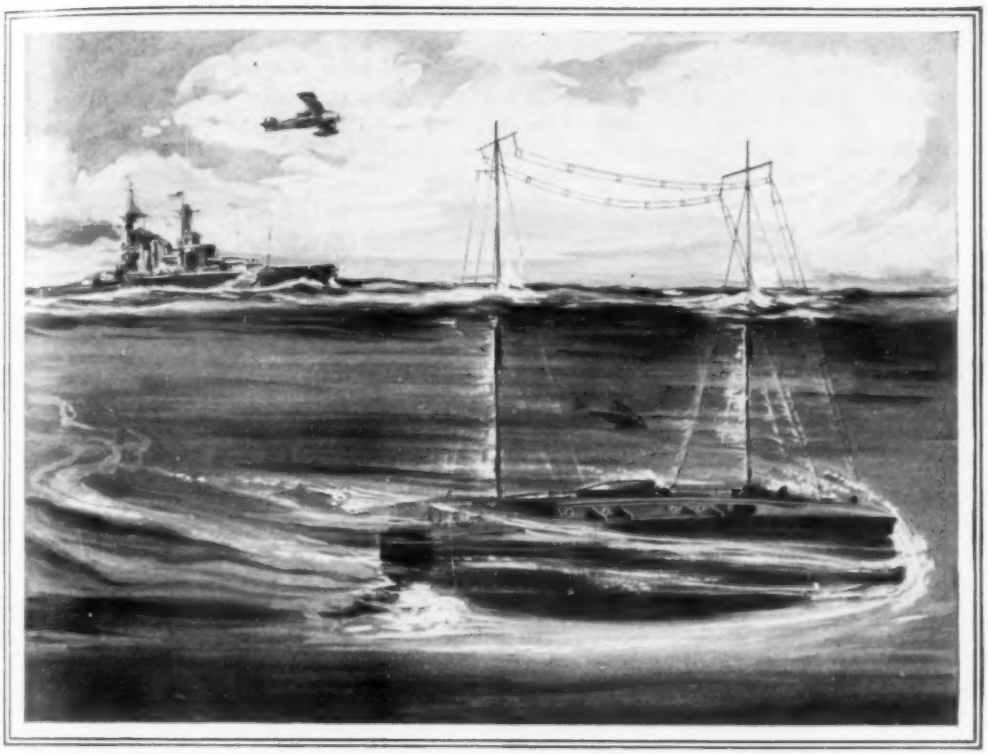
Great Britain was ready to introduce her new poison gas, which was so heavy that it could be projected against the wind without rolling back; an electric apparatus to explode ammunition dumps behind the enemy lines, flying warships, literally torpedo boats with wings, and was experimenting with death rays which showed promise of being able to bring down enemy airplanes by stopping their engines. France had a rocket to set fire to airplanes by spraying them with liquid fire, a 20.4-inch howitzer that was a bit more frightful than anything Germany produced in the way of portable big guns, and several other inventions.

One of the war-time mysteries that puzzled the Germans, was England's Q-boats, the famous "hush-hush" ships. The exploits of the German raider "Moewe," a converted merchantman which still looked innocent while carrying concealed batteries, suggested the idea. The Q-boats were built from the slowest, most dilapidated old tramps available; too old to run or put up a fight, and easy picking, apparently, for a U-boat.

Besides their innocent appearance these ships were manned by men who were real actors, the "panic parties" specially chosen for their task. When the submarine shoved its periscope above the surface to take a look at one of the waddling old tramps, the panic party got busy going through all the emotions of a mob scared to death preparing to abandon ship without waiting for its destruction. They rushed around lowering boats while the submarine came to the surface and drew near, ready to send off a boat to plant a bomb or fire a well-placed shell from its deck gun. Then, when the Germans were almost alongside, huge false bulwarks dropped down exposing a row of five-



"Blisters" on a Ship Hull as Protection against Torpedoes; the Big Bulges Exploded the War Head Before It Could Touch the Real Hull and Cause a Fatal Rent in the Steel Plates



An American Invention That Came Too Late for War Use, a Radio-Controlled Submarine Which Could Attack without Risking Anyone's Life, Since It Was Operated by a Distant Ship

inch guns. Many a submarine was sunk in this way.

If the enemy did succeed in getting in a torpedo, it was not enough to sink the Q-boat, which had been specially reinforced with timber and cork to keep it afloat and in action until it burned almost to the water's edge. The cork protection suggested another war-time invention, the "blister," which was applied to many ships. It was simply a streamlined bulge all along the hull to explode the torpedo before it came in contact with the real hull. The blisters slowed up the ships somewhat, but that defect has been corrected in newer American battleships by building the blister inside the hull instead of outside.

One of the queerest stories of war-time strategy, though it was never put to practical test, was the gun buoy invented by the Italians. They observed that the Austrian submarines operating in the Mediterranean for some reason had a habit of coming to the surface near a navigation buoy just at dawn. The habit became so regular that the Italians quietly built a slightly larger buoy, with a small cannon and gun crew concealed inside, and moored it in place of the regular one. The buoy was arranged like a Q-boat, so that its sides could be dropped to permit the gun to fire. One of the jealously guarded French war secrets was an invention to eliminate the telltale flash by which batteries in action could be located at night. Research disclosed that the flash of flame from the gun muzzle was due to a second violent explosion when the released carbon monoxide and methane gases came into contact with the oxygen in the air. M. Delpech, a French scientist, found that a little vaseline added to the powder charge would stop the flash, the loss of heat being compensated for by an increase in the firing charge.

Another problem of night fighting, which Italy had some success in solving, arose when Italian aviators attempted to bomb Austrian towns after dark. The planes were invisible, but their motors were so noisy that the enemy searchlights quickly located them. To install mufflers

to drown the sound would have decreased the efficiency of the engines too much, so scientists were called in. A device that met with considerable success resulted, the work of a professor of acoustics in a small Italian college. Instead of tackling the problem from the engineering standpoint he considered it as one in acoustics and worked out a system of reflectors that made the sound apparently come from a spot several hundred feet away from its true source.

AIR POLICE FORCE IN GERMANY PROTECTS FLYERS

Aerial traffic has become so heavy in Germany that a special police squad is maintained at one of the landing fields to help direct the aviators on arrival and departure. By means of signal devices, messages are relayed to the pilots and, at night, rockets and searchlights are employed to guide the flyers. The corps has established headquarters near Berlin.

CHIEF CAUSE OF AUTO MISHAPS IS "HUMAN ELEMENT"

More than eighty out of every 100 automobile accidents are due to human carelessness or lack of skill, according to a recent survey of motor mishaps in England. The investigation gave added proof that man's ability to anticipate danger and protect himself has not developed so rapidly as science has developed machinery. Of 443 cases involving death, less than six per cent were due to faults in the vehicles, seven and one-half per cent to the condition of the roads, three per cent to weather conditions, fires and similar circumstances, while the rest were attributable to causes within the control of some person or persons. The survey emphasized the need for further instruction of the public—both drivers and pedestrians—as to the proper use of the streets.

Copyright, Henry Miller

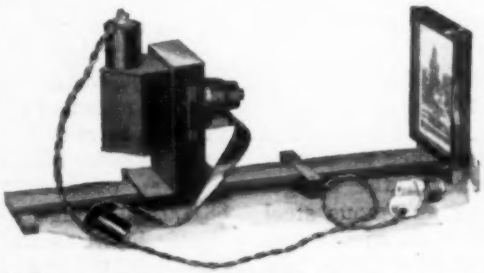
Upper View, Airplane-Traffic Police with One of the Signal Flags; Firing a Rocket and One of the Searchlights That Relays Directing Word to Pilots

RADIO CODE FOR MEDICAL AID AT SEA

For some time, radio has been used to great advantage in obtaining medical aid for persons suddenly taken ill while at sea, and to increase the effectiveness of this service, a British surgeon has devised a code report form. It contains twenty-nine items relating to the patient and his illness. In case of a radio call for aid, information could be broadcast according to this standardized list, entered accordingly, and an accurate record kept both at the sending and receiving ships or stations. It includes the most important points of a diagnosis, would insure a complete summary and prevent useless detail.

MOVIE FILMS MADE LARGER WITHOUT CUTTING REEL

Enlargements up to post-card size are quickly made from a motion-picture reel, without cutting or damaging the film in any way, with the aid of a simple magnifier lighted from an electric socket. The negative reels furnish enlargements directly on bromide paper, while an enlarged negative may be taken from a positive film for duplicate prints or still greater enlargements. The outfit consists of focusing mount, paper holder, adjustable in all directions, lamp and wire connection. No screws or gears are used in the assembly. It is small and easily packed in photographic kit.



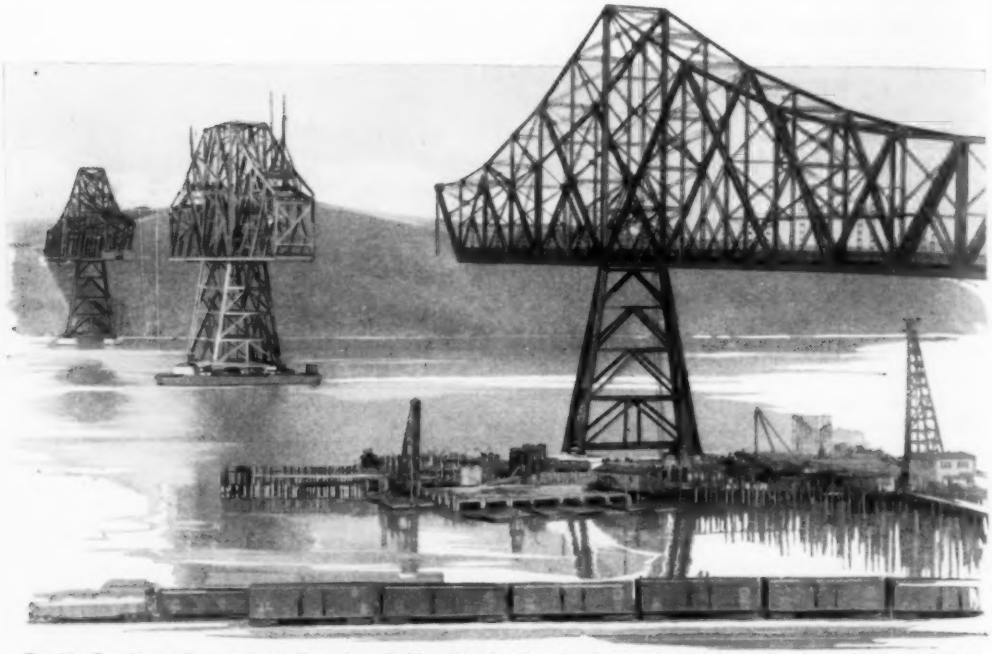
Making an Enlargement Directly from Movie Film without Cutting the Strip

Sketch of Proposed Labor Temple for Chicago; Seventy Stories High, It Would Cost $75,000,000 and Be the World's Trade-Union Center

SEVENTY-STORY LABOR TEMPLE TO COST MILLIONS

One of the latest skyscrapers proposed for Chicago is a seventy-story temple of labor under consideration by the Chicago federation of labor as a world center of trade-union activities. It would contain offices and meeting halls and would cost approximately $75,000,000, according to present plans.

¶The cactus plant is of American origin.



Double-Cantilever Spans of the Carquinez Bridge Waiting for the Connecting Links to Be Assembled and Lifted into Place above the Deep Ship Channel of San Francisco Bay

Sand Boxes Lift Giant Bridge into Place

Seven Hundred and Fifty Tons of Steel to Complete World's Longest Highway Bridge Raised High in Air by Sand

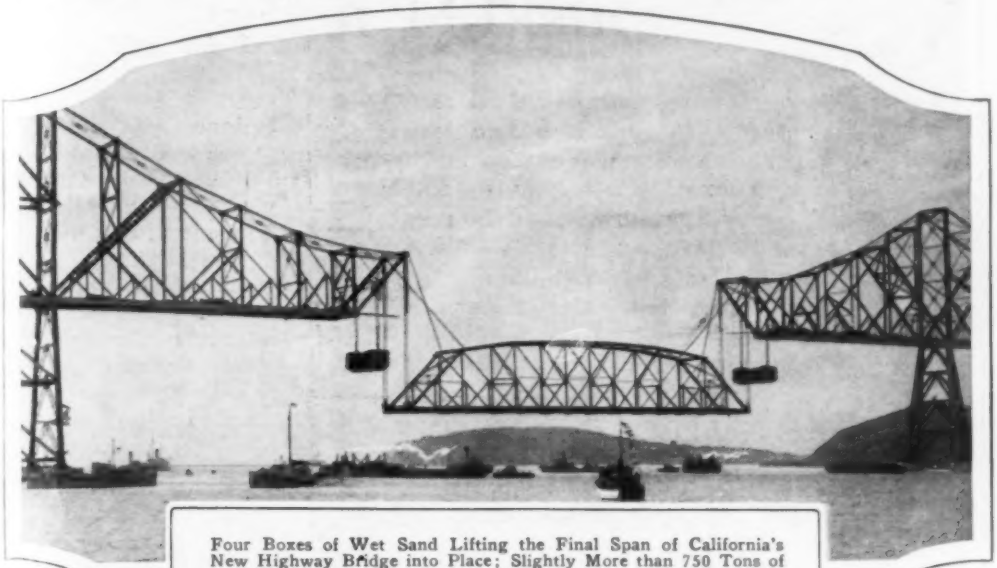
LIFTING an enormous steel bridge span, 125 feet in length and weighing 750 tons, to a height of 135 feet above the water with only four boxes of wet sand as a counterweight is an unusual feat recently successfully performed by the engineers erecting the Carquinez highway bridge across the upper end of San Francisco bay. The bridge is the longest highway structure in the world, though its two 1,100-foot spans are not as long as the suspension spans of the Quebec and Firth of Forth cantilever bridges, or the main suspension spans of several other similar bridges elsewhere.

The final gap in the California bridge was the center section of one of the 1,100-foot cantilever spans. To close it, the 125-foot section was assembled on barges and towed to place beneath the bridge. Steel cables, rigged over enormous steel blocks suspended at the ends of the two cantilever arms, were attached to the section, and the task of filling the boxes hung from the cables began. The sand method was chosen not only because it furnished a cheap form of power, but because the gradual loading of the boxes added bit by bit to the weight carried by the cantilever arms, instead of forcing them to take up the entire 750-ton load at once, enabling the engineers to check the bending stresses as the weight was applied.

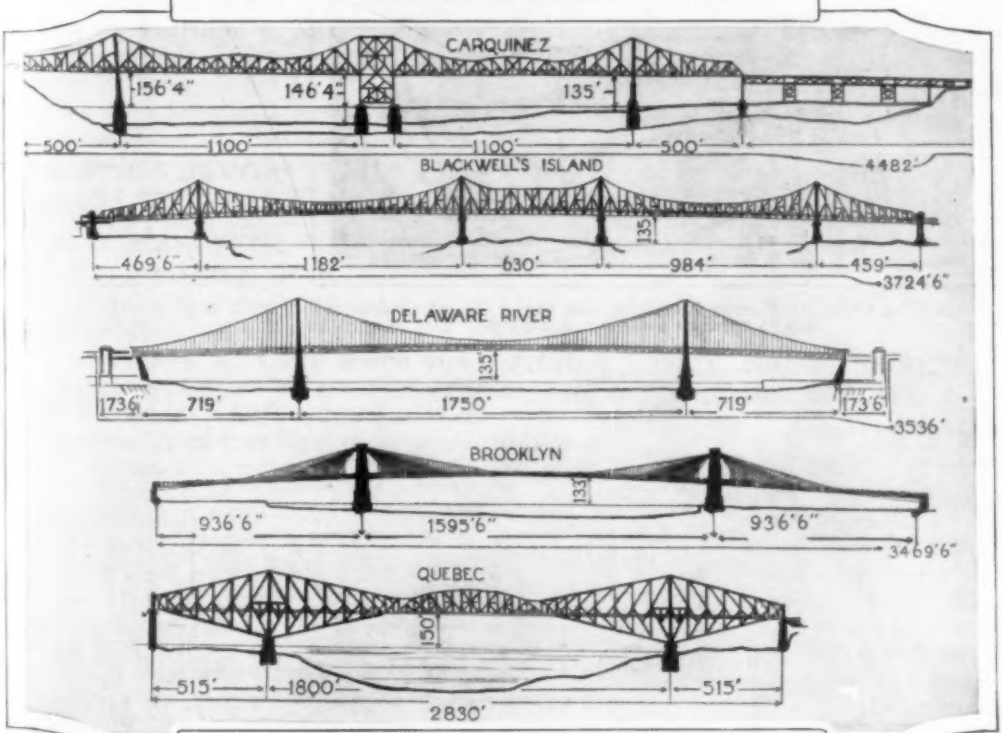
Once the span swung free of the barge, however, it gave a good test of the extra safety allowance, for each cantilever then supported 1,500 tons, or twice the weight it will be required to carry. The balance between bridge span and sand was so carefully adjusted that the engineers regulated the lift to one foot a minute, taking 135 minutes to raise the great steel weight the same number of feet.

When opened to the public, the new $8,000,000 bridge will form a link in the Pacific highway and avoid the necessity of crossing the bay by ferryboat from Vallejo to Crockert.

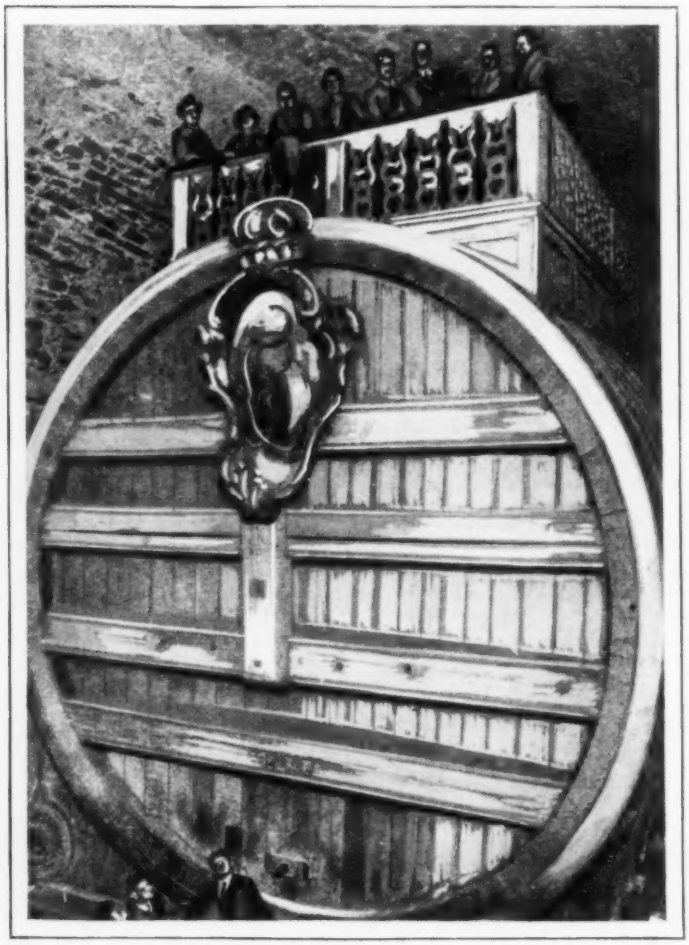
UNIQUE ENGINEERING FEAT COMPLETES BRIDGE



Four Boxes of Wet Sand Lifting the Final Span of California's New Highway Bridge into Place; Slightly More than 750 Tons of Sand Were Used to Raise the Huge Steel Bridge Section at the Rate of One Foot a Minute for Two Hours and a Quarter



Comparative Sizes of the World's Greatest Bridges; Quebec Has the Largest in the Cantilever Class and the Delaware River at Philadelphia the Greatest Suspension Bridge, But the Carquinez Structure Leads in Over-All Length



Huge Wine Cask, the Famous Heidelberg Tun during Recent Celebration; Size Is Apparent from Human Figures

ANCIENT WINE CASK HOLDS FIFTY THOUSAND GALLONS

Probably the only barrel in the world that is honored with a birthday party is the celebrated Heidelberg tun in Germany, a huge wine cask now 475 years old. It is thirty-six feet long and twenty-four feet high and holds more than 50,000 gallons. It rests in a cellar under Heidelberg castle and is the central feature of a jubilee celebrated each year.

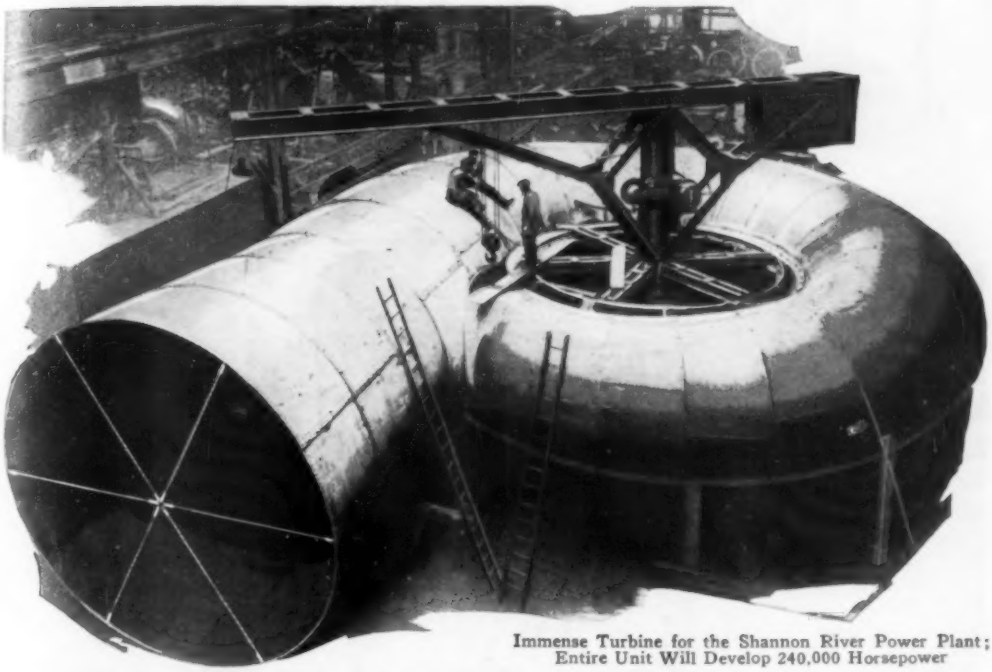
GOLD RECOVERED FROM AIR

Picking gold out of the air suggests a fairy tale, but that is exactly what is done at the New York assay office in Wall street. Tests have shown that the method is saving the government thousands of dollars that otherwise would be wasted. The minute particles of the metal are taken from the fumes in the smelting furnaces. High-pressure forced draft drives the gases up the stack to "settling chambers," where the gold is taken out by a special electrical process before the residue fumes are released. Since the mechanism was installed, it is estimated that gold to the amount of not less than $12,000 has been recovered.

NOVEL VENTILATOR IS PROOF AGAINST DRAFT AND DUST

Adjusted outside the sash and equipped with closely woven copper-wire screen, which is said to keep out eighty per cent of the dust, a window ventilator made of heavy sheet steel has a series of hooded openings that break up the direct air currents to exclude drafts, rain and snow. A particular advantage is that the window can be opened or closed without removing the ventilator. The unit is supplied in various sizes to fit different requirements, and is finished in a color that blends with almost any scheme of decoration.

Window Ventilator Which Permits Closing or Opening Sash While in Position and Breaks Up Direct Draft



Immense Turbine for the Shannon River Power Plant; Entire Unit Will Develop 240,000 Horsepower

SHANNON RIVER POWER PLANT TO HAVE SIX TURBINES

When completed, the power plant being installed on the Shannon river near Limerick, Ireland, will be larger than any unit under one supervision at Niagara, it is said. The six huge turbines will develop 240,000 horsepower. The size of the plant may be gauged by the enormous tubes, one of which is shown here. It is nearly sixty-six feet long and the intake is almost seventeen feet in diameter.

RADIO "MAGIC" LOCATES RICHES BURIED CENTURIES AGO

With the aid of a radio detector, treasure hunters in Panama City already have found gold ornaments, chains, emeralds, rubies, diamonds and other riches which were buried in the latter part of the seventeenth century by Sir Henry Morgan. Search is being made for other caches which are believed to have been hidden in various parts of the city. The find was made in tunnels beneath an old church. The radio apparatus is similar to those which have been in use for some time by prospectors and others in searching for ore and oil deposits. The presence of metals beneath the surface is revealed by variations in signals from the detector as the radio waves strike substances offering different degrees of resistance.

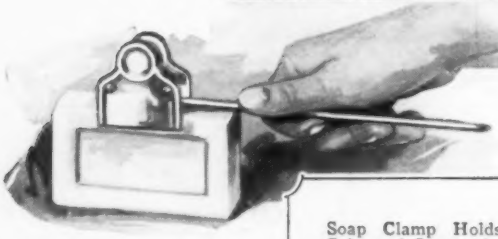
CHALK LINE WITH PLUMB BOB SAVES TIME AND WORK

A serviceable tool for the kit is a combination chalk line and plumb bob, operated like a tape measure and so compact that it may be carried in the pocket. The chalk is carried in a waterproof chamber and the line, which can be locked at any required length, is wound on a reel turned by a handle that folds out of the way. The bob is easily attached or taken off, being secured to the line with an eye. The chalk chamber is big enough to hold a sufficient supply for six months' use.

TIME *and* MONEY *for*

Sink and Electric Dishwasher in One; the Washer Is at Left; Water Is Forced Up by Motor Below and Sprayed over Dishes in Rack

Insulated Cover for Milk Bottle Prevents Freezing and Souring, and Keeps Flies Away

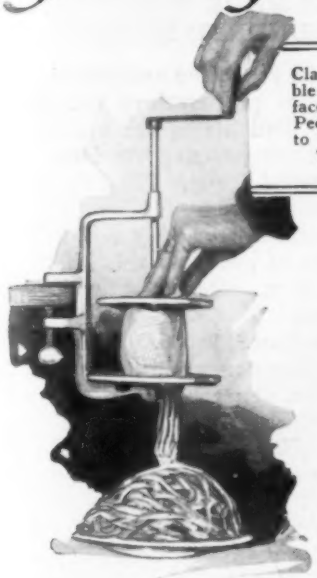


Soap Clamp Holds Cake and Spares the Hands in All Kinds of Scrubbing; Below, a Combination Measuring Glass and Fruit Squeezer That Catches the Juice in a Cup

To Keep the Heels of the Stockings from Wearing Out, Adjustable Rubber Strip Fits inside the Shoe and Is Quickly Glued On to Stay in Position

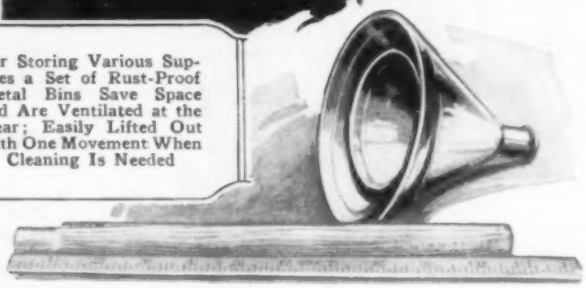
Anyone wishing further information on devices described in the editorial pages can

SAVING THINGS *your Home*



Clamped to Table or Other Surface, Vegetable Peeler Can Be Set to Cut Different Thicknesses

For Storing Various Supplies a Set of Rust-Proof Metal Bins Save Space and Are Ventilated at the Rear; Easily Lifted Out with One Movement When Cleaning Is Needed



Double Vacuum Cup for Laundering Delicate Fabrics Is Made of Aluminum and Has Detachable Stick for Packing

Why Bend Over to Use Shoe Horn? This One Has a Long Handle for Sitting Upright and Affords Powerful Leverage without Hurting the Fingers

Seven-Bladed Wire Chopper and Pie-Crust Flaker Improves Pastry and Is Easily Cleaned

What the Siberian "Doctor" Wears to Frighten Spirits; Queer Costume with Its Collection of Charms

MAGIC DOCTOR WEARS ODD GARB TO FRIGHTEN SPIRITS

The costume worn by the "medicine man" in northern Siberia suggests that of a junk dealer rather than a healer, for it consists of a weird collection of metals, brass bells, dangling bars of copper and other articles, attached to his back. Rattling and shaking these things as he performs his rites is supposed to help frighten away the evil "spirits" causing sickness.

WHITE CARDS PROTECT HIKERS ON ROADS AT NIGHT

Pedestrians are in more or less danger on automobile roads at all times and particularly at night. An effective guard has been found in a piece of white cardboard, worn or carried so that the light from approaching cars will strike it and attract the attention of the drivers. Small electric lights, white belts and illuminated hats are also available for the night hiker.

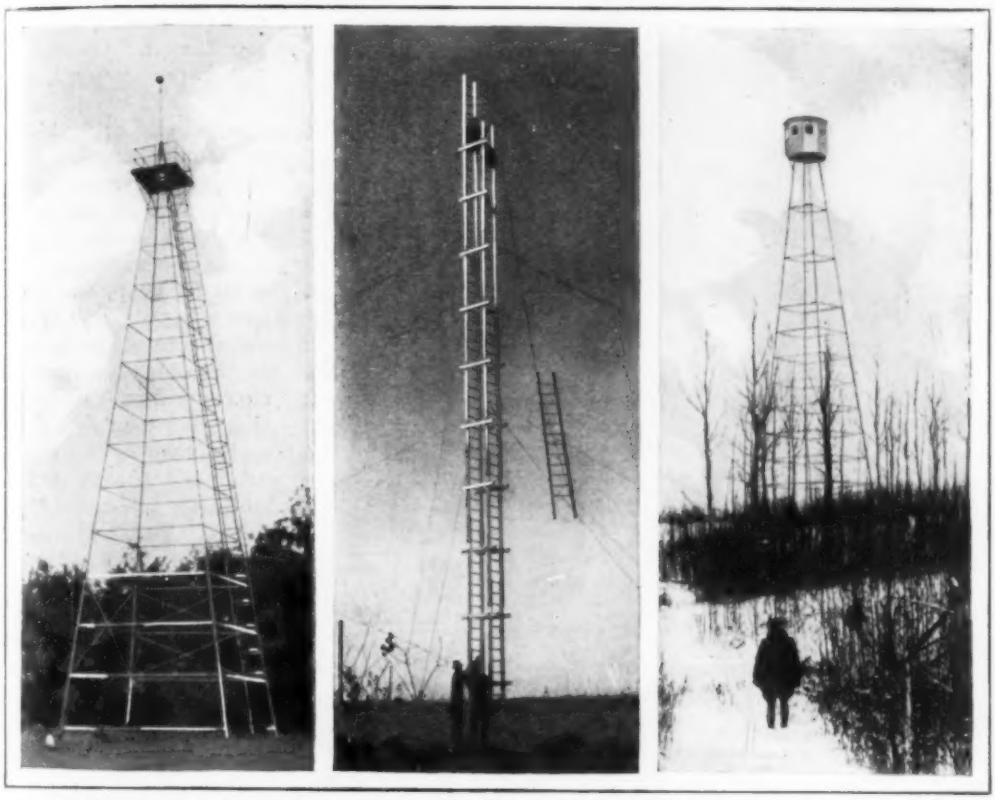
COSMETICS MADE HERE TOTAL OVER HUNDRED MILLION

In the last ten years, the amount of perfumes and toilet preparations manufactured in the United States has multiplied six times, according to reports from the American chemical society. The development of this industry here is shown by the fact that exports are steadily increasing, large quantities of goods of this kind being sent to China, Japan, England, and other countries. The annual output is valued at more than $140,000,000. Creams, rouges and similar commodities rank first, their production aggregating $34,000,000, dentifrices are second to the amount of more than $25,000,000, and talcum and toilet powders next with a total of more than $21,000,000. The increased popularity of many kinds of cosmetics since the war is said to be the main cause of the rapid growth of the business.

PUMP FOR BOTTLES SIMPLIFIES OILING AND SPRAYING

For applying a wide variety of liquids directly from the bottle, a small force pump prevents waste and reduces work and trouble. Inserted in the container, it is held by the finger through a loop, and is operated by moving the bottle down and up. The liquid is forced through a nozzle which may be regulated to pass a solid stream or a spray. Applying paint and varnish removers, treating plants, oiling auto and stationary machinery parts, are a few of the pump's many uses.

LOFTY FIRE TOWERS GUARD CANADA'S FORESTS

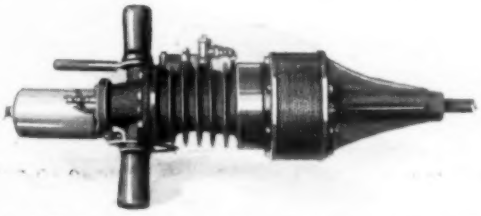


Types of Observation Towers Used in the Canadian Forests, to Guard against Fires; the One Illustrated in the Center Is of the Demountable-Ladder Kind for Portability

Tens of thousands of dollars are being spent every year in Canada to save forests. Keen-eyed men have their lookout stations on lofty towers throughout the heavily-wooded regions and are always on the alert to discover any signs of smoke. The towers are built high above the surrounding trees and afford the watchers a clear view in every direction. Some of the installations are of the inclosed-cabin type of steel tower, offering protection from strong winds and making it possible for the men to live right in the tower. In order to select these tower sites to the best advantage, demountable observation ladders are used, which were originally devised for military purposes. This outfit can be readily loaded on a small truck and can be erected at any desired spot by three men in a very short time, thus doing away with unsatisfactory and costly "hit-and-miss" methods of picking the sites.

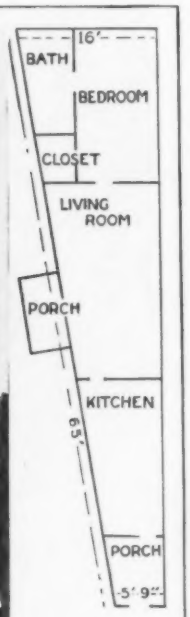
HAMMER MAKES ITS OWN POWER FROM GASOLINE

Electric motors, compressed-air apparatus and other equipment are not needed in operating a portable drill hammer, just introduced, for it is provided with its own power plant. This consists of a simple mechanism moved by exploding gasoline. The entire unit is contained in a chamber just above the drill, and it is said that the hammer will run four to five hours on a single gallon of fuel.



Drill Hammer with Its Own Power Plant, a Gasoline Unit in Chamber Just above the Drill

QUEER HOUSE BUILT TO FILL WEDGE-SHAPED LOT



Narrow End of the Wedge House, Floor Plan, and a Side View Showing Pleasing Appearance

If you had a lot less than six feet wide at one end and sixteen feet at the other, with a total length of only sixty-five feet, you probably would not consider building a dwelling house on it. But architects in Seattle, Wash., designed a residence to fit a plot of those proportions with pleasing and practical results. The entrance to the dwelling at the narrow end is but five feet nine inches wide.

SEEK TO PROLONG FISHES' LIFE WHILE IN CAPTIVITY

How certain kinds of fish that normally endure captivity only for a brief time, can be induced to live longer, is the subject of research by directors of the proposed Shedd aquarium in Chicago. Swordfish cannot be kept in tanks, for the small ones are too nervous to thrive in confinement and the grown fish are too large. Goosefish, salt-water herring, kingfish, mackerel, anchovies and other kinds of rapidly moving fish seldom live more than a week or so in captivity. Fish that habitually live in darkness are also difficult to keep, for they injure each other in seeking to hide. So far as possible, the natural surroundings in which these nervous fish normally live, will be reproduced in the aquarium, in an effort to keep them longer. Water at constant temperature, natural food, protection against disease and efficient methods of aerating the tanks are among the measures proposed for making the fish comfortable. The task of keeping the slow-moving fish is relatively simple, so far as insuring their living to a mature age is concerned. In Europe, some species of carp have been known to live 100 years in their native habitat, and eight or nine years in captivity is not unusual. Bass, salmon, pike, big catfish, trout and the common goldfish live four to seven years. Some become so accustomed to their particular tank that they die if placed in another, while others thrive until strangers

are introduced into the community, in which case it is not uncommon that all die.

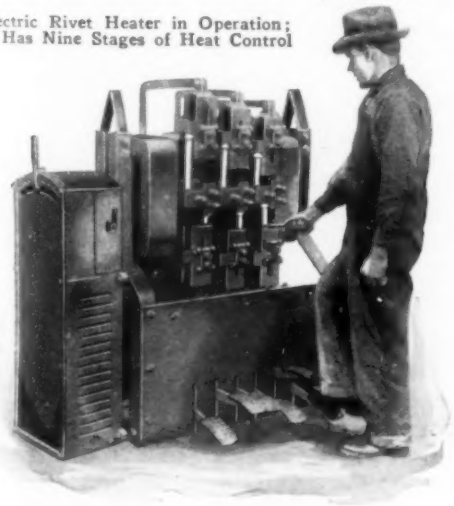
HEATING ALFALFA SEED

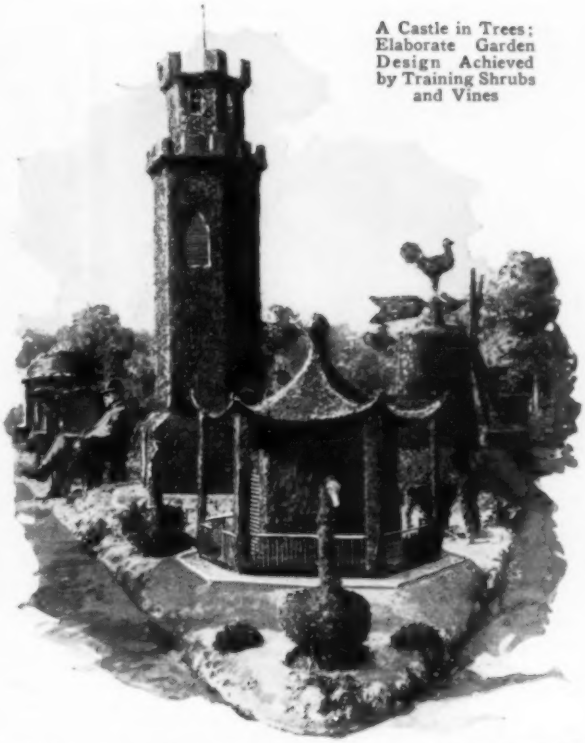
Farmers have experienced considerable difficulty in raising alfalfa for the reason that many of the seeds are so hard that they will not absorb moisture and, consequently, will not sprout. Miss Anna M. Lute, of the Colorado experiment station, is reported to have overcome this trouble by subjecting the seed to heat. From many tests, she has found that a temperature of 167 degrees Fahrenheit gives the best results.

ELECTRIC RIVET HEATER SAVES EXPENSE IN BUILDING

Economy, through a saving in labor and faster operation, is claimed for an electric rivet heater to replace oil or coal-burning forges and furnaces. It is made in various sizes and affords, in two types, nine steps of heat control. With the larger sizes, a good operator can handle 600 rivets an hour and still larger numbers of the smaller rivets, it is said. The outfit uses alternating current and is adjusted to give a thorough heating without causing scale, burning, or the likelihood of heads popping off.

Electric Rivet Heater in Operation; It Has Nine Stages of Heat Control





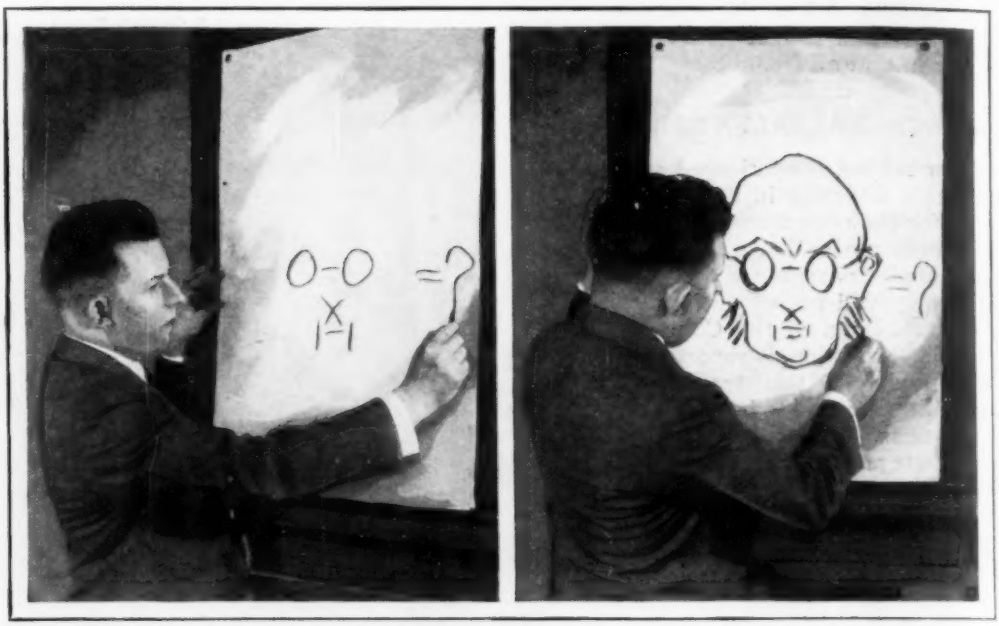
A Castle in Trees; Elaborate Garden Design Achieved by Training Shrubs and Vines

MODEL CASTLE OF LIVE TREES NOVEL GARDEN DECORATION

Pine, cypress and yew trees in a French garden have been trained into fantastic shapes resembling a small castle and other forms. Some of the pieces are grown about a framework, but others are shaped simply by careful and constant trimming.

SMOKESTACKS OF OLD VESSELS PROTECT RAILWAY ROADBED

Sections of smokestacks from salvaged ships are used on a mid-western railroad to protect the roadbed from steam when the locomotives are blown off at watering places. They are placed in such a way that the tops are flush with the track, and as steam is blown from the engine boiler close to the rails, it passes into these receptacles, where it cannot dislodge the ballast or scald persons near by. A drain is provided to carry off hot water and impurities, while the steam itself escapes through the top of the stacks. An additional feature of the plan is that it eliminates discoloring of the ballast.



The Evolution of the Professor from One of His Problems; a Simple Chalk-Talk Problem When Hidden Perforations, Visible Only to the Artist, Guide His Crayon

Invisible Pattern Makes Chalk Talk Easy

No Artistic Skill Needed to Make Rapid Drawings When the Lines Are All Shown by Minute Perforations

CHALK-TALK entertainments as given by professional performers require months of careful training and preparation, for even a skilled artist cannot always sketch amusing cartoons off-hand with the bold sweeping lines which hold the attention of a crowd. But with a little preparation anyone, even without drawing ability, can present a satisfactory parlor or social entertainment.

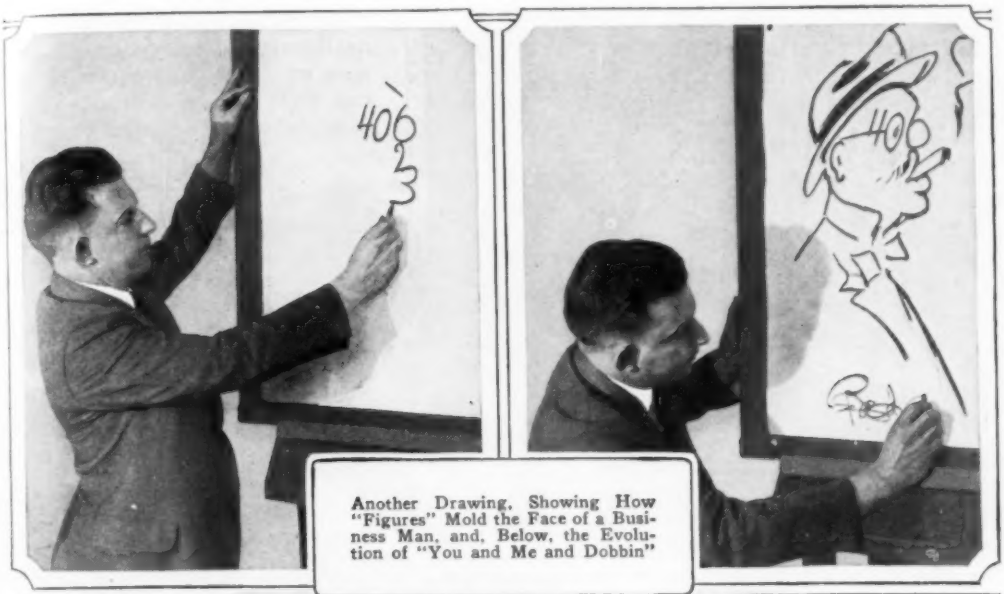
The secret lies in having all the drawings done in advance and transferred to clean white sheets as rows of minute perforations, perfectly visible to the artist, but so fine they cannot be detected by spectators seated half a dozen feet away. The perforating is done quickly with an ordinary tracing wheel, such as used by dressmakers in making patterns.

Cartoons of any kind, especially favorite characters from the newspaper comic sheets, make excellent material for parlor amusement, but the most interesting drawings, and the ones that lend themselves best to the "patter" with which the artist keeps the audience's attention while he draws, are the "evolution sketches" in which a face is constructed from letters, figures or other material.

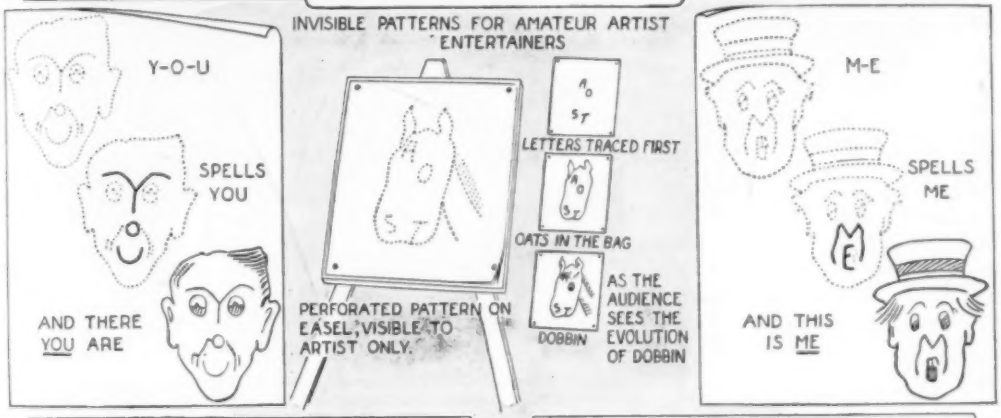
A program can start with the artist printing the letters Y, O and U on the big white sheet on his easel, and then, while he entertains the audience with some bright talk, explaining that evolution of man was from letters instead of monkeys, he deftly sketches in a face, which, he says, will represent his composite audience, and when the sketch is done the letters have become the nose, mouth and line of a double chin.

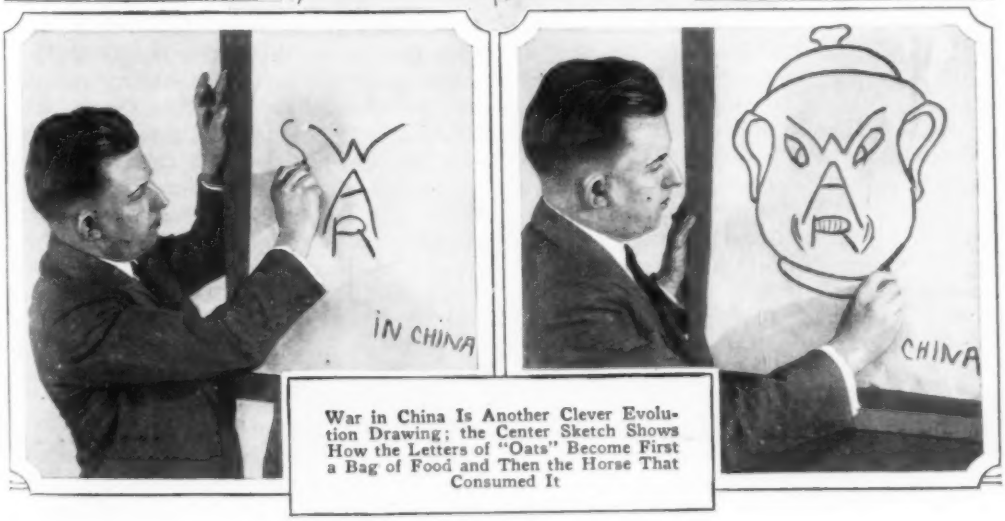
The sheet is torn off, and the letters M and E drawn on the next one, while the artist explains that, as further proof of his evolution theory, he will demonstrate his own case. A few strokes and the letters again are part of a cartoon representing the entertainer's features.

Frequently individuals in the audience

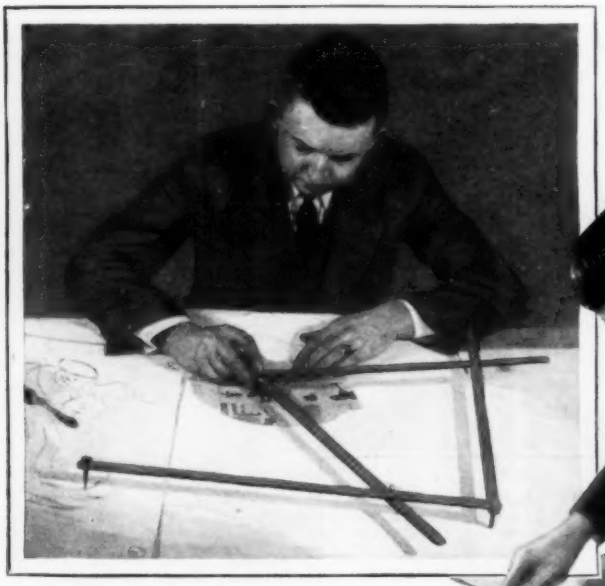


Another Drawing, Showing How "Figures" Mold the Face of a Business Man, and, Below, the Evolution of "You and Me and Dobbin"





War in China Is Another Clever Evolution Drawing; the Center Sketch Shows How the Letters of "Oats" Become First a Bag of Food and Then the Horse That Consumed It



Using a Pantograph to Enlarge a Small Comic-Section Drawing

can be singled out to fit in with the ready-prepared sheets, and the patter that goes with them. The evolution idea can be carried a step further by remarking that a man's occupation is brought about through processes of evolution, that a man whose family tree is made up of accountants, bankers, bookkeepers, mathematicians and men of similar professions, will have a face made up of figures. As he talks the artist jots down, seemingly at random, a series of figures, 0, 1, 2, 3, 4 and 6, then rapidly fills in the connecting lines to complete the drawing.

Another interesting evolution sketch can be presented with an alleged reminiscence of school days, when problems were transformed into the professor's features. As he talks, the artist writes 0-0 x 1-1, and then transforms it into the professor's face.

Some of the chalk-talk drawings are even more complicated in their final evolution, keeping the audience guessing. The letters O, A, T and S, set down at random, spell oats, and then they can be placed in a bag, but with a few more deft strokes the bag becomes a horse's head—the evolution from oats to horses.

Some of the drawings can be presented in various ways. One that lends itself to two developments is the map of China. Announcing he can draw a map of the country from memory, the artist sketches a china teapot, pauses to comment on present disturbed conditions in that country, and adds the letters W, A and R, when a few more quick strokes will complete the picture of the man who started the trouble. Or, reversing the process, the word "war" can be drawn first, and the words "in China" added at the bottom of the sheet. While the audience watches breathlessly to see what is going to be done with the word, the china bowl is drawn around it, inclosing the "war" within "china," and then the face is completed.

Transferring an Original Drawing to a Blank Sheet, Underneath, by Piercing the Lines with an Ordinary Dressmakers' Tracing Wheel

And now for the process by which any amateur with no previous drawing experience can present the entertainment.

Obtain a supply of large sheets of plain white paper—ordinary newsprint from the left-over rolls at the newspaper office will do. Also get a large sheet of wallboard

or a large drawing board, build an easel to support the board and obtain a dressmakers' tracing wheel and a number of thumbtacks.

First work out the drawings in full size on sheets of paper, enlarging them from the sketches shown here, or taking cartoons from the newpapers. When a drawing is completed, place it over a blank sheet of paper, and with the tracing wheel, run over each line, perforating it into the blank sheet beneath. The original drawing, or master sheet, is then saved for future use, as it can be traced over and over again for successive talks.

When all the tracings have been completed, assemble them in the order in which you wish to present them, place a plain blank sheet on top of the pile, and pin all of them to the wallboard or drawing board with large thumbtacks. The plain top sheet hides the perforations if anyone should come close enough to inspect the board before you start.

When you are ready for the talk, make a few lines on the plain sheet, then tear it off as though spoiled. That exposes the first of the tracings, which, under artificial light, will be visible only to you, and not to your audience.

Use a large and very soft, black drawing crayon, or piece of charcoal, which will make wide and very black lines.

Exact enlargements of cartoons from the newspaper comics can be made by using a pantograph, which can be obtained from a dealer in drawing instruments, or made at home from a few strips of wood. One end of the pantograph is fastened to the table, a stylus is traced over the lines of the drawing to be copied, and a pencil fastened at the outer corner traces an exact enlargement on another sheet of paper.

¶ Virginia is said to rank next to California in the amount of sunshine received annually.

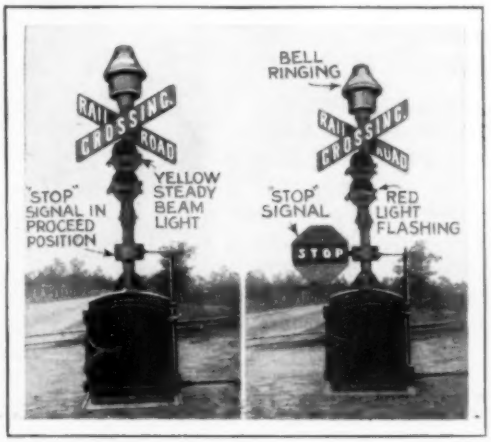
ELECTRIC FLASHLIGHT IN CANE SAVES POCKET SPACE

Cane Light Turned On, Showing Its Usefulness in Helping Select Right Key

Concealed in the handle of a cane, a powerful little flashlight is useful in emergencies. The batteries are hidden in the stick. The cane lamp saves carrying a flash in the pocket, an objectionable procedure to those who do not like to burden themselves with too many articles.

TRAIN LIGHTS CROSSING SIGN RINGS BELL AND SETS FLAG

Trains give warning of their approach on a crossing sign which is fitted with a bell, lights and a stop flag, moved automatically into a clear position when the train is coming, but remaining hidden when the crossing is safe. A yellow light burns to give the signal for the railroad, and, when the train enters the block, this light is replaced by a flashing red one, while the stop sign, a large yellow reflecting disk, appears. The bell continues to ring until the train is past.



"Proceed" and "Stop" Positions of the Crossing Signal, Which Is Operated Automatically by Trains

STOOL HAS ADJUSTABLE SEAT LOCKED WITH STEEL BALLS

Adjusting the Stool Seat, and Diagram Showing Balls That Wedge against Bar, to Hold Stool in Position

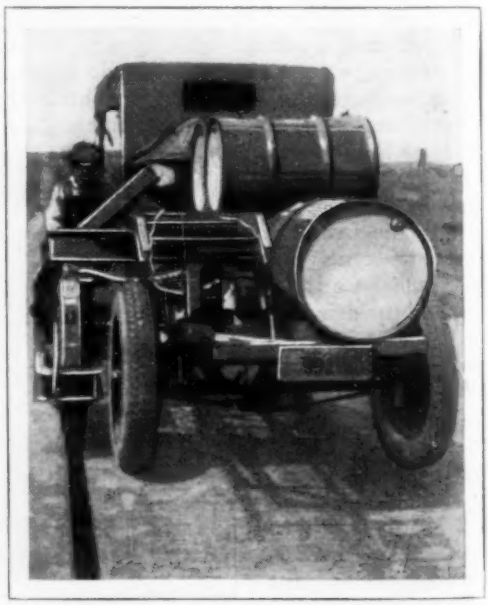
Gravity and steel balls simplify adjustment of a new stool to various heights. When the stool is in an upright position, the balls wedge between a round steel bar and a tapered chamber wall to keep it in place. To elevate it, a pull is all that is necessary, and to lower the seat, the stool is turned upside down, the legs pulled up slightly and then pushed down. It is said that the seat will hold a person of any size or weight and that it will not easily get out of order.

GROUND WIRE LEADS AIRPLANES TO SAFETY IN FOG

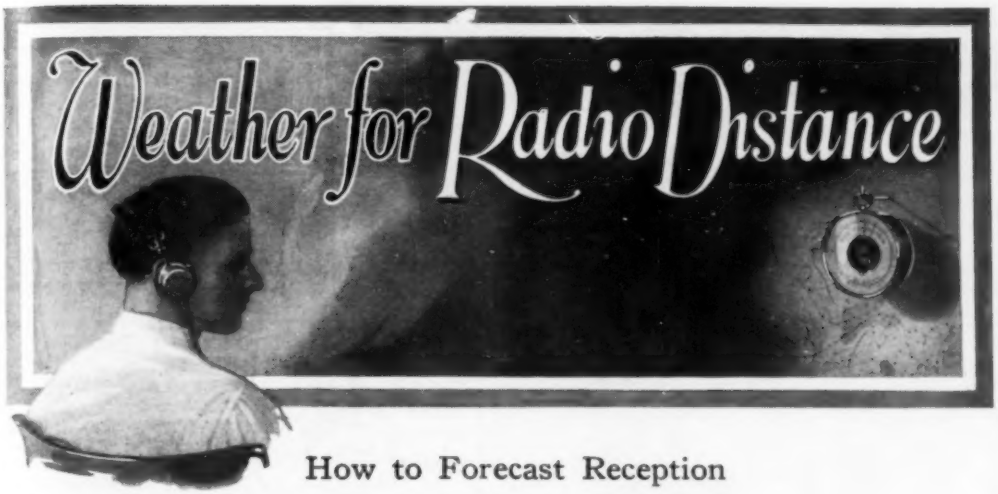
Experiments with an electric leader cable to guide airplanes to their landing field have been successfully carried out by the British air corps. The cable idea is based on the submarine cable, laid in New York harbor several years ago, to guide ships in and out, delicate apparatus on the vessel picking up signals sent through the cable on the sea bottom, and telling whether the ship was over or to the right or left of the leader. For aerial use a five-mile cable was laid in a very elongated oval, so that both ends would be at the same place, getting away from the difficulty of returning the current without disturbing the magnetic field. The cable is intended to supplement neon-tube lights used to pierce the dense English fogs. The neon glow will penetrate 300 feet of fog when the airplane is well above it, but as the ship descends, the light disappears for some time, and then reappears when the plane is about 150 feet above the ground. Coils on the airplane wings are used to pick up the current from the leader cable, and an instrument in the cockpit not only shows the whereabouts of the craft, but likewise indicates the distance above the ground at which it is flying.

TRUCK TO CENTER-LINE ROADS SAVES TIME AND COST

Hundreds of miles of automobile roads were marked with a center traffic line at a minimum of expense and time with the aid of a special truck, equipped with a fifth wheel for applying the safety guide. Paint was carried in barrels on the auto and supplied to the marker through a valve. To insure keeping in the middle of the pavement, a wheel, taken from a motorcycle, was placed on an extension frame in front of the bumper and run just off the roadway. While painting, the truck makes about two miles an hour.



Marking Auto Highway with Truck Outfit That Paints Line from Supply Contained in Barrels



How to Forecast Reception

¶Local static forecasts coming better reception from the west.

¶Southern stations come in best after a widespread snowstorm.

¶Big drop in temperature indicates good weather to last several days.

¶Face the wind. Stations to right and left will come in better than those in front of or behind you.

DAILY radio-reception forecasts may soon become a part of the weather reports given by the newspapers, as a result of experiments that have shown the close connection between weather and wireless distance.

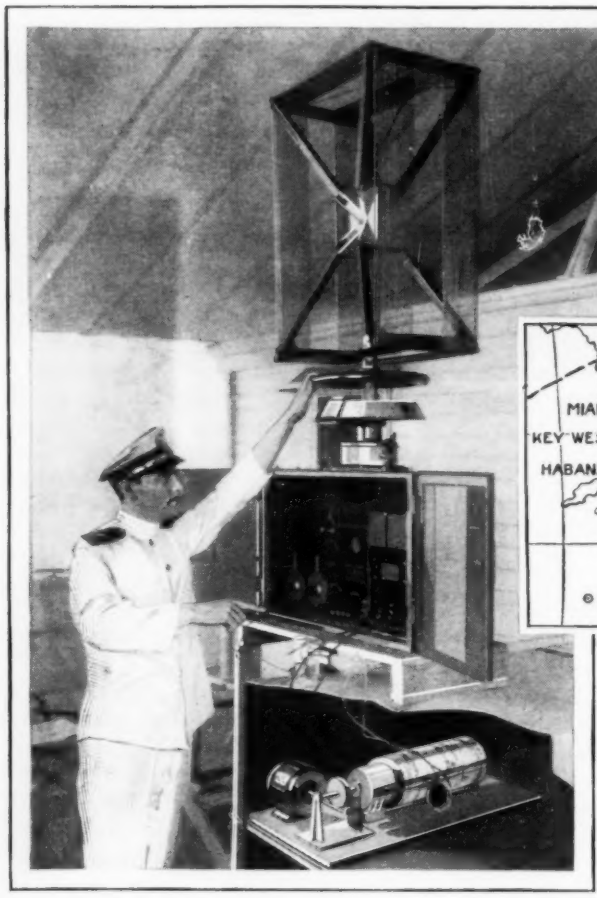
Professional operators have known for a long time that the direction from which static came always indicated a storm center, but it is only recently that rules have begun to be worked out by which the proposition can be reversed in order to obtain from the weather map the location of stations which will come in with good volume over long distances.

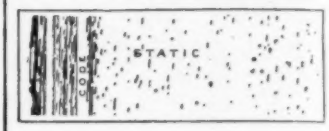
The problem is considerably simplified because of the fact that generally storms move across the United States in an easterly or northeasterly direction. If a storm center is shown on the weather map between Omaha and Denver today, it will probably be in the vicinity of Chicago tomorrow, and move on toward New York and New England the next day. So, when static blots out stations to the west, it indicates a coming storm.

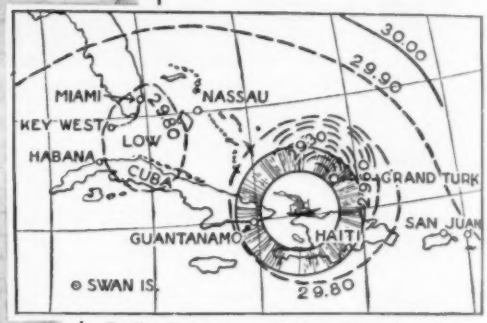
In that way it is possible to tell something about coming weather by listening to the loud speaker grumble and howl, but the radio fan who likes to pull in the distant stations can put the knowledge to much more use by taking the daily weather map and figuring out what stations he has a good chance of bringing in.

The weather map is covered with a series of lines, called isobars, amid which are printed such descriptive words as rain, snow, warm, cold, low and high. If the smaller and inner circle is marked "low," it is a storm center, to which winds from other places are moving, and if it is marked "high," it indicates the place from which winds are coming to equalize pressures elsewhere.

When you sit down at your receiver and take a look at your barometer, it may show a high reading of around thirty inches, with clear, good weather outside. But when you pick up the daily weather map and start selecting stations to go after, you will find a situation something like this, pictured from an actual map issued one day recently: Over southern Iowa, northern Missouri and a small slice of eastern Kansas and southeastern Nebraska, as well as western Illinois, there was a "low" or storm center. Therefore there was static originating in the neighborhood of the broadcasting stations in St. Louis, Kansas City, Davenport and







Radio Compass and Map Recorder, Left, and, Above, Graphs of the Miami-Hurricane Static, Normal Static and Wireless Code; Chart Shows Vessel's Position and Static Picture during the Hurricane, with Storms All around Her

Des Moines, Iowa, Omaha, Nebr., and neighboring cities; hence not much chance of a distant listener, say in New York, picking them up.

But go a step further, and out on the western coast there was nothing but high in California, with a low up north in Washington. And between San Francisco and New York all the isobars of the Missouri storm crossed the path between coast and coast at virtually right angles. Under such conditions the east coast would get the west coast with good volume, and on the night in question did.

Not everybody has access to the daily weather map, however, particularly those living in rural districts. But with a barometer and a bit of practice it is possible, from one night's reception, plus local weather conditions, to forecast rather accurately what the next night will bring.

If the barometer is falling rapidly, indicating an approaching storm, it will show that much of the static heard is of local origin, under which circumstances few or none of the distant stations can be heard. But when the storm passes and moves on to the east, it should be followed by good reception, first from the north and later from the west. A steady and gentle rain, lasting for a day or more and not accompanied by lightning, frequently is followed by improved reception from southern stations. When both north and south stations come in good, there will usually be good reception from the west, and rather poor to the east.

A set with a tickler dial makes a good weather forecaster, for, when a storm approaches, it is necessary to turn the tickler higher to get the added regeneration necessary to bring up signals which have become muffled by static. Conversely, good weather requires less regeneration.

The navy recently has turned static to practical account by making it take a picture of itself to show storm centers at sea. Hooking a radio-map machine, designed to pick up weather maps transmit-

ted from Arlington, to a direction finder, and then revolving the loop aerial, the navy wireless engineers get a perfect picture of the static at every point.

Homemade Decorative Loop

An attractive loop can be made from odds and ends about the average home, as shown in the illustration. The parts required are inexpensive: An ordinary lamp standard, which, if not already on hand, can be obtained from the local furniture dealer; a picture or piece of framed tapestry, a length of dowel stock and two wood sticks, cut and shaped as shown and as long as the picture or tapestry is wide. Remove all electric fittings from the standard, and cut it to a length that will mount the loop at the required height. Replace the metal tube in the standard, and drill a hole in the dowel pin so that it will make a snug fit when slipped down over the tube. Drill a hole the size of the dowel through the center of one of the wood strips and screw this to the back of the picture near the bottom. Another hole is drilled part way through the center of the upper strip to take the top end of the dowel and allow the finished loop to revolve. This strip is then screwed on in the position shown. Any loop of the pancake type may be used and is fastened to the back of the picture by means of string and small screweyes. For the average set, this loop should consist of about 86 ft. of stranded loop wire with the turns spaced about ¼ in. apart.

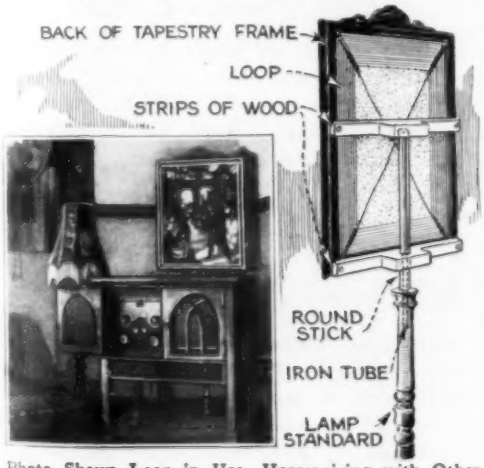
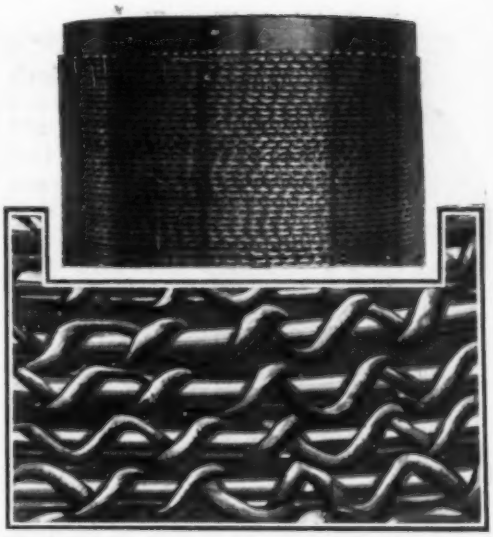


Photo Shows Loop in Use, Harmonizing with Other Furniture; Right, Details of Loop and Mounting



Below, Enlarged View of the Winding Showing Separation of Turns; Above, Finished Coil

New Wire Provides Air-Spaced Winding

A new wire providing space-wound coils automatically, has been introduced by an English manufacturer. The wire is not completely covered but has two strands of insulating material wound spirally around the wire core. The insulating strands not only separate the turns but also lift the entire winding clear of the tube form. This makes possible good low-loss coils without bakelite tubing, or skeleton forms, cardboard tubing taking the place of the more expensive forms. The wire is made in various gauges, and in both solid and stranded patterns. In the latter, the strands are not twisted around each other in the usual manner, but lie parallel, being held together by the insulating winding. Wire of this kind is excellent for use in loops.

Use Old Tubes for Testing

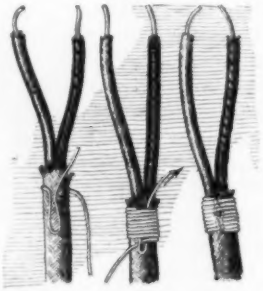
Keep on hand one or two old tubes that will light although they will not do for the set. These tubes are useful in testing the wiring in a newly completed set and will often save a good tube if there is some mistake. Keep them in a handy junk box where they will be out of the way and still be accessible. The old tubes are placed in the sockets of the new set, and if they do not blow out, it is safe to put in good ones.

Radio World-Time Clock

This clock tells correct time in all parts of the world from London (Greenwich), around the globe to Berlin, and is now available for radio long-distance fans who wish to compute the time in various parts of the world quickly. It is also of interest in the handling of radiograms.

Binding Frayed Insulation

The ends of fabric-covered telephone cords or flexible leads often fray out so as to make the terminals unsightly. This may be prevented by using stout, waxed cord, or twine, as shown in the illustration. A loop is made in the cord as at the left, and the free end wrapped around the phone cord and loop as in the center, leaving a small bight of the loop exposed. Then the free end is passed through the bight, and the upper end pulled until the loop disappears below the winding. The ends of the cord and frayed ends of the insulation are then clipped off, as shown at the right, making a neat binding with no external knots showing.



How to Mount Panel on Baseboard

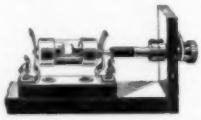
When screwing the panel to a wooden baseboard, space the holes in the lower edge of the panel correctly, so that they will come in the center of the edge of the wood subpanel and not split out. Drill small holes for the wood screws before trying to screw them in place; a drill about half the size of the wood screw should be used. This will give a good tight fit and prevent splitting.

Improved Method of Shielding Radio Receiver

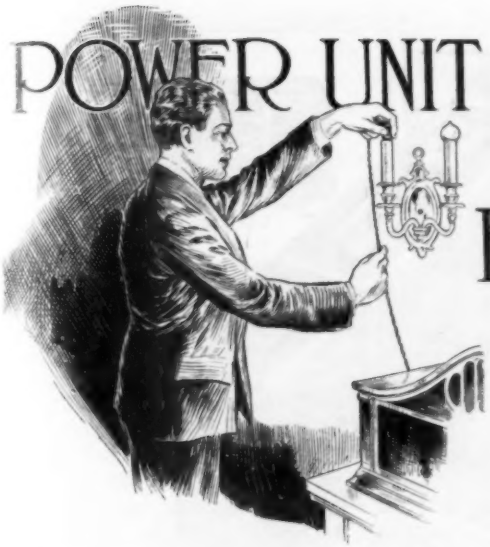
It is a tedious and difficult job to shield a radio receiver with thin metal sheets. Owing to the tendency of thin metal to bulge and the difficulty of handling, it is hard work to turn out a neat-appearing job. To accomplish this in a simple manner, use the following method: Solder a wire to a small piece of metal, fasten this with a woodscrew to the inside of the cabinet near the ground post, and connect the wire to the latter. Paint the interior of the cabinet, and the inside surface of the panel with any of the well-known metallic paints, such as aluminum or gold-bronze. Be sure to have all the painted surfaces join, but do not let the paint come in contact with any of the instruments, painting around them instead. Also paint over the metal piece that connects to the ground. Metallic paints are good conductors of electricity when dry. They are easy to apply, and if the work is carefully done, the finished job will be neat and attractive. I have been using this method for some time, and find it very efficient.—Prof. William Hoppie, Los Angeles, Calif.

Adjustable Gridleak Employs No Sliding or Pressure Contacts

A new adjustable gridleak, by which, it is claimed, all microphonic noises which accompany the use of carbon or graphite are eliminated, has been placed on the market. There are no sliding or pressure contacts. The glass cylinder which is hermetically sealed, contains a high-resistance liquid. As the thumbnut of the leak is turned for adjustment, the electrodes enter this liquid more or less, giving a range of exact values for the tube circuit and signal. It can be slipped into any standard fixed-condenser clips.—L. H. Georger, Buffalo, N. Y.



POWER UNIT ELIMINATES ALL BATTERIES

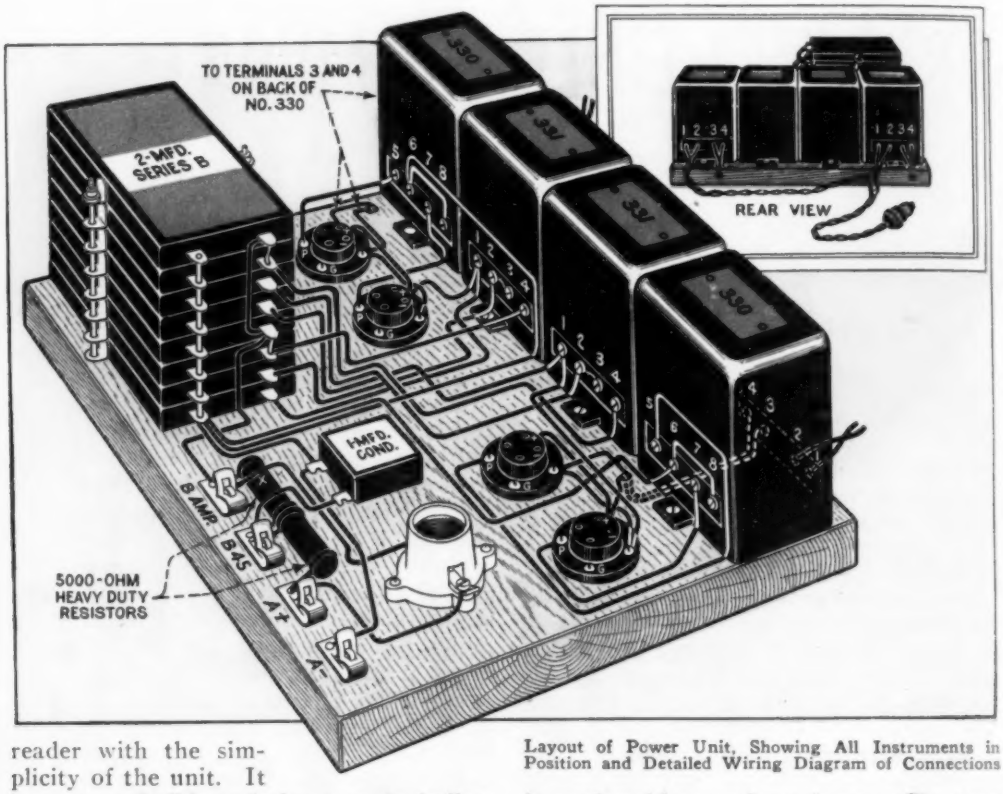


By FRANK L. BRITTIN

REPLACING A, B and C-batteries with one compact unit and supplying all the necessary voltages to the receiver, the instrument described here is a real eliminator, in the full sense of the word. It has been thoroughly tested in Popular Mechanics radio laboratory and found to supply sufficient humless A-power to operate up to nine tubes of the 201-A type with their filaments wired in series, in addition to providing sufficient B and C-power for these tubes. The series wiring of the tube filaments, shown in the diagram on page 1008, reduces the current demand to that required for one tube, although the voltage, of course, must be increased with any addition to the number of tubes, and this is easily managed. Another advantage of series wiring is that the "drop," or slight loss of voltage across the filament of one tube can be used as a C-bias for the grid of some other tube in the circuit, and this is pointed out in the diagram. Without going into further details, the simple wiring diagram on page 1008 shows the reader how he can change his present set to use the new unit. Note carefully the sequence of the tubes in the filament circuit, and the necessary 1-mfd. condensers across the detector and r. f. tubes, as these points are important. The upper circuit diagram shows a much simpler arrangement, which is the one advised if a new set is built especially for use with the unit. Such a set, of the 4-tube type, will be described in the coming July issue, and will be combined with the unit in one cabinet. The unit is designed for 60-cycle alternating current, 110 volts, and cannot be used on any other supply. This prologue to the actual building of the unit is given so that the reader may understand the conditions under which the unit can be used before attempting to build it.

Installing Device in Console, Showing Comparatively Small Space Required for the Complete A, B and C-Power Unit

The detailed layout and wiring diagram on page 1006 will immediately impress the



Layout of Power Unit, Showing All Instruments in Position and Detailed Wiring Diagram of Connections

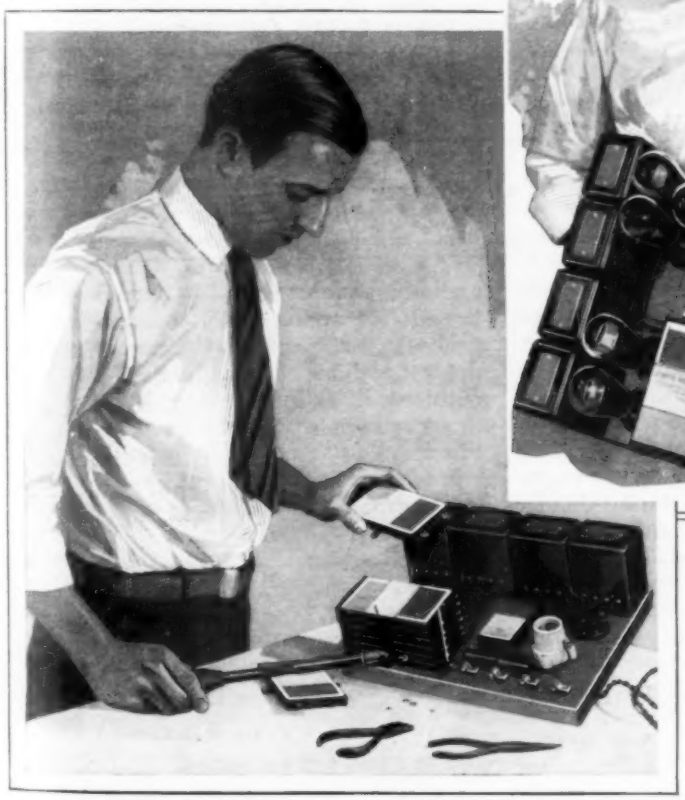
reader with the simplicity of the unit. It is easy to build, and the cost, including the rectifier tubes, is about the same as that of a storage battery, charger, and a good B-eliminator. Much advantage rests with the ABC-unit in that it requires no attention whatever and may be very simply controlled by a snap switch at the wall socket, which also controls the operation of the receiver.

The various parts are mounted on a 1 by 10 by 13-in. baseboard, which easily fits in the battery compartment of the average console, as shown in the photo on page 1005. It is even possible to install it in an ordinary cabinet with the set, as will be shown in the July issue. The simple arrangement of the various parts on the baseboard is clearly shown in the sketch. The condensers are stacked and held in place by means of two brass rods, threaded No. 6-32; these are pushed up through the holes drilled in the baseboard, and the condensers held firmly in place by means of washers and brass nuts. Two heavy-duty resistors are connected across the A-positive, B-45 and B-amplifier terminals, and the resistor marked "X" may be replaced by a universal-range Clarostat if the builder wishes to vary the detector-plate voltage. The 1-mfd. condenser mounted back of the resistors is a safety device, and should be of the 400-volt type, as it must carry the entire output of the power supply, which is about 600 volts, if the line current is turned on without the receiver filaments being connected to it. Remember this caution, and never turn on the house current, unless the receiver, with all tubes in place, is connected to the power unit. The 1-mfd. condenser might carry the load, but damage may result. The rear view, in the insert above the detailed sketch, shows the 110-volt 60-cycle supply connected to both sections of the power unit, and terminating in the usual wall plug. A snap switch can be connected in this line, or the unit disconnected by removing the plug from the wall socket, as desired.

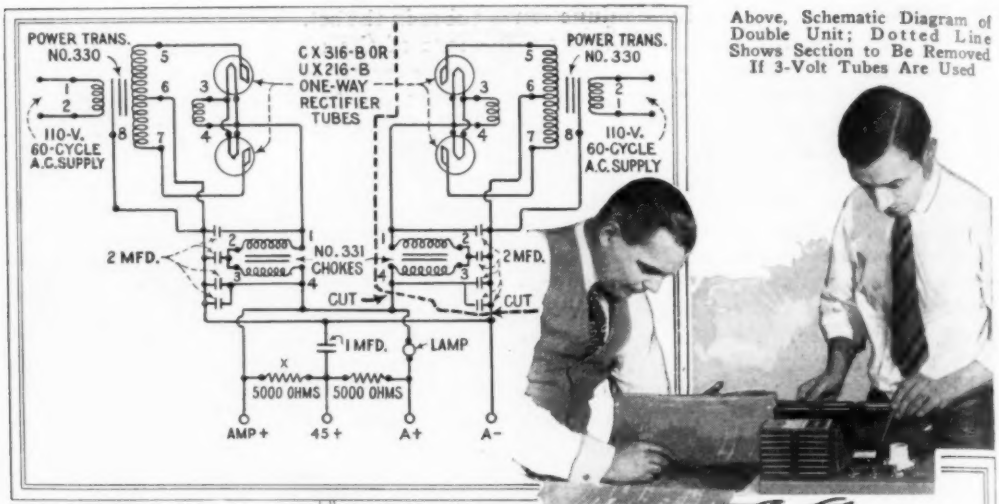
The device is really two distinct eliminator units, as may be seen in the schematic diagram at the upper left on page 1008, each unit being an exact duplicate of the other. These units each use two

CX316-B rectifier tubes in conjunction with a transformer, chokes and the necessary heavy-duty condensers. In all there are four rectifier tubes, two transformers and two filter systems. If your set employs tubes of the 199 or similar 3-volt type only half of this double unit is required. The dotted line dividing the two units in the upper drawing, page 1008, shows how the section at the right may be cut away without disturbing the resistors, terminals and control lamp which must be retained. At this point it becomes necessary to explain what this control lamp is, and why it is used. The power output of the two units is in the neighborhood of 160 volts at 250 milliamp. when the tubes are connected, and, in order to reduce this to a suitable value for the receiver-tube filaments, a common 25 or 40-watt Mazda lamp is placed in series with the filaments and the power supply. If only one section of the power unit is used, two 10-watt lamps should be placed in series to reduce the filament supply to the low rate required for the small tubes in the set. If the set employs five or more of the small tubes, it may only be necessary to use one 10-watt lamp. In other words, the lamp acts as a resistance that can be varied by the size of the lamp employed.

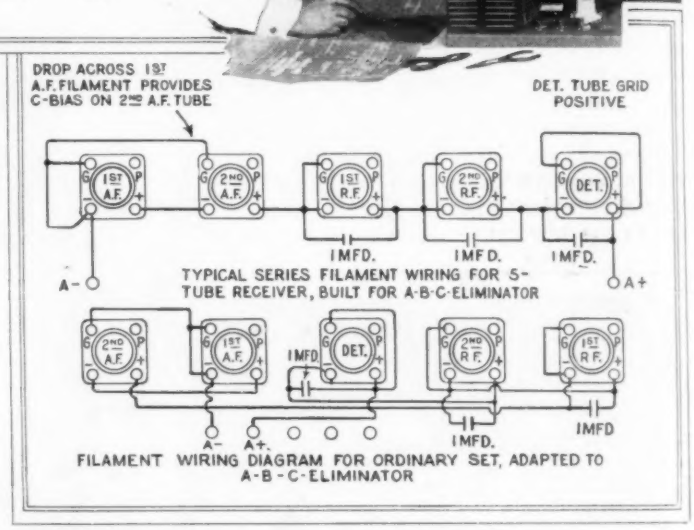
For example, in a five-tube set using 201-A tubes and the double power unit, all tubes in series will draw about 25 volts at ¼ amp., and the 25-watt lamp will draw about 120 volts at ¼ amp., thus making 145 volts at ¼ amp. The plate circuits of the tubes will take 20 milliamp. more and this will account for the drop in voltage of the power supply from 160 volts to 145 or 150 volts in actual practice. The simplest way to determine the correct lamp to use for a six, seven or eight-tube set would be to connect the tubes, in series with the lamp, to the power supply, and try, first, a 25-watt, 120-volt lamp; then a 25-watt, 110-volt



Left, Assembling Condenser Pack; Above, Completed Unit Ready for Installation



Above, Schematic Diagram of Double Unit; Dotted Line Shows Section to Be Removed If 3-Volt Tubes Are Used



lamp; then a 40-watt, 120-volt lamp, and finally a 40-watt, 110-volt lamp. With one of these lamps, the builder will be able to obtain the proper filament voltage which can be measured by a common d. c. voltmeter of the type used for checking B-batteries, connected across the filament of any tube in the set; the reading should be between 4½ and 5 volts. Obviously, when connecting tubes in series, the tubes on which the greatest voltage is desired should always be hooked nearest the negative end of the eliminator. These will be the audio-amplifier tubes. The detector, which requires the least plate voltage, is placed nearest the positive end. Of course, you cannot hook the second audio amplifier tube directly at the negative end for then you would not be able to get the necessary C-bias; therefore the first audio-amplifier tube is hooked in below the second audio, which will give 5-volt grid bias, or "negative-C," on the grid of the last audio tube. If 10-volt C-bias were required, it would be necessary to utilize the drop across two tube filaments instead of one.

However, for all practical purposes, the 5-volt drop across one tube appears to be satisfactory. In connection with the alter-

MATERIAL LIST

1 baseboard, 1 by 10 by 13 in.
8 Sangamo wound condensers, series B, 2-mfd.
1 Sangamo condenser, series A, 1-mfd., for 400 volts d.c.
2 Silver-Marshall power transformers, type 330.
2 Silver-Marshall unichokes, type 331.
4 standard X-type sockets.
1 common porcelain socket.
4 UX216-B, or CX316-B rectifying tubes.
2 Lynch, Ward-Leonard, or similar type, heavy-duty resistors, 5,000 ohms.
4 Fahnestock clips.
6 ft. lampcord, with plug.
Woodscrews, flexible, rubber-covered fixture wire (well insulated, stranded type).
2 brass rods, 5 in. long, No. 6-32 thread, 1¼ in. long, on each end.
4 No. 6-32 brass nuts and washers.

ation of standard receivers to series filament wiring, there is only one precaution to be observed, and that is, to bypass all r. f. and detector-tube filaments with 1-mfd. condensers, as shown in the filament wiring diagram.

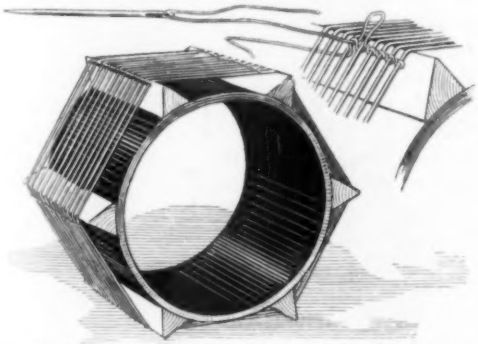
A large detailed blueprint may be obtained from the Popular Mechanics radio department, 200 E. Ontario st., Chicago, for 25 cents, to cover postage and packing. Specify blueprint No. 119.

Repairing Loud-Speaker Diaphragm

Loud-speaker diaphragms of the mica type, while very efficient, are not as rugged as some others. Having one that was cracked, I tried various materials for replacing this diaphragm, and at last found that a disk of hard maple, cut to proper size and sandpapered to a uniform thickness of 1/32 in., served very well. The tone quality was improved.—Malen W. Clark, Flint, Mich.

Homemade Low-Loss Coils

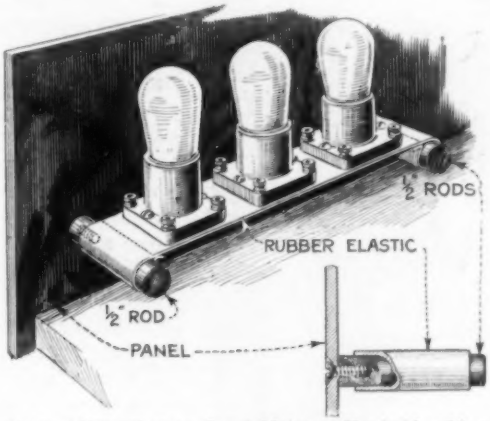
By using a short length of cardboard tubing and gluing six lengths of wood, bakelite or hard rubber on the outside, at equal distances apart, efficient low-loss coils can be made at home. The strips are planed or filed so that they have a triangular cross section and, if made of wood, should be coated with collodion or shellac, to prevent absorption of moisture. Bakelite or hard rubber is, however, the better material. To separate the turns of the coil evenly, a silk cord is run over and under them as indicated, or if desired, equally spaced nicks are cut along the edge of the strips with a knife file.



Cardboard Tube and Narrow Strips of Wood or Bakelite Make Good Form for Low-Loss Coil

Shock-Absorbing Tube Mounting

When tube sockets are rigidly mounted on the subpanel of a receiver, vibrations are readily transmitted to the tube elements, causing howls, which increase in intensity. These howls are called "microphonics" and can usually be eliminated by providing a shock-absorbing cushion under the sockets. The same result can be obtained by mounting them on a wide strip of rubber, which is fastened at both ends as shown in the illustration. Flexible wires should be used for making connection with the sockets instead of rigid busbar wire, which permits vibrations to be transmitted to the tubes even if they are mounted on a shock-absorbing base. The sockets should be held securely while inserting the tubes, to prevent tearing the rubber or pulling the wires loose.—H. R. Wallin, Brooklyn, N. Y.



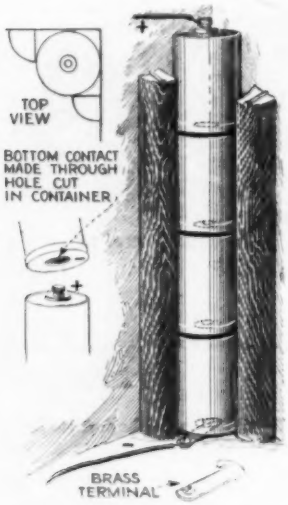
Strip of Wide Rubber Band Makes a Shock-Absorbing Base for Tubes

Keep Aerial Away from Power Lines

When installing the aerial, be careful that no part of it runs over or under any electric wires or cables that may be on or near the building. Do not place the aerial near such wires, as they may be carrying high-voltage currents and, if the aerial should fall or come in contact with such wires, the high voltage would be conducted into the set—a very dangerous possibility. Always place the aerial at right angles to any power line in the vicinity; this will prevent the picking up of any interference from such lines.

Simplifying Battery Connections

Most radio owners have their individual ways of handling dry-cell batteries, but the method shown in the illustration, used by one experimenter, is very simple and efficient. This consists in a compact assembly where the cells, placed one above the other, make connections in the same manner as in large flashlights. To make the negative contact a circular disk is cut from the base of each cardboard container so that the positive terminal of the cell below makes contact at this point. Two pieces of 1-in. quarter-round molding are nailed to the wall, in a corner of a closet, or at any other convenient point, to hold the batteries in an upright position. A small brass terminal on the floor, at the base, provides a negative terminal of the assembly, and the positive connection is taken from the center post on the top battery.—G. A. Luers, Washington, D. C.



New High MU-Tube Increases Volume

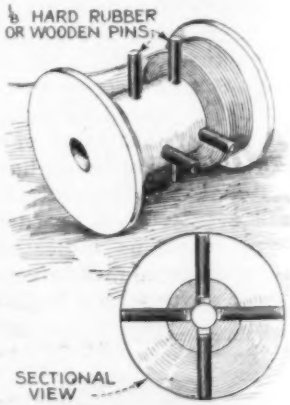
A new "high MU" amplifier tube, known as the CX-340, has lately made its appearance on the market. It has been developed especially for resistance-coupled and impedance-coupled a. f. amplification circuits. The filament voltage required is 5; filament current, .25 amp., and the recommended B-voltage is from 135 to 180. The amplification factor is 30 instead of 20, as claimed for former tubes of this type. The requirement of amplifier tubes for resistance and impedance coupling is identical, but entirely different from the tube requirement for transformer coupling. This being the case, many radio owners who have been using resistance or impedance-coupled amplifiers with the standard A-tubes have not been obtaining the best possible results from their receivers.

Fishing Poles for Aerial Masts

The auto camper will find a fishing pole handy for an aerial mast, as poles are usually a part of the camper's outfit and can be put to double use where it is difficult to erect a temporary aerial. The aerial wire, if sufficiently flexible and of small size, can be wound on an old reel. It is then easily unwound and will not become tangled. The pole may be lashed upright to the car and the wire stretched to some tree.

Homemade R. F. Choke Coils

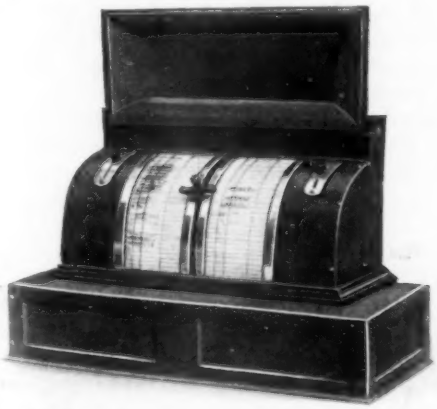
Radio-frequency choke coils are used more and more, especially in short-wave receivers, and sets where it is difficult to keep the r. f. current out of the audio stages. Experimental r. f. choke coils are usually wound on empty sewing-cotton spools. Such chokes, however, have a large distributed capacity, as the layers of wire are very close together. The capacity may be considerably reduced by breaking up the winding into sections, or "slabs," and connecting these in series. The forms may be turned from wood or hard-rubber rod of suitable diameter, but as this necessitates the use of a lathe, the common wood spool may also be used. The sketch shows how three sectional windings may be separated by two sets of wood or hard-rubber dowel pins driven into holes drilled through the spool. The pins are about ⅛ in. in diameter, and their ends should be tapered to prevent splitting when they are forced into the holes. The lower illustration shows a cross section of the spool, giving the position of the dowel pins in the completed form. The winding of the



choke coil is carried out as usual, a total of about 300 turns of No. 30 gauge wire being required for the broadcast range. Wind 100 turns into the first "slot," then fill the next with another 100 turns, and finally the last slot. The wire is carried over from one section to the other without a break.—C. A. Oldroyd, Barrow-in-Furness, England.

Receiver Resembles Cash Register

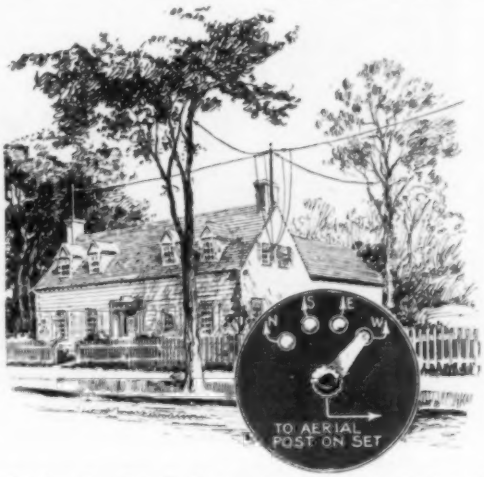
Resembling a cash register, the radio receiver shown in the photo consists of three units, a base for holding the batteries, the receiving unit, which is a five-tube r. f. circuit, and a loud speaker. Tuning is done by means of levers connected to the condenser shafts, and extending through the casing of the set. They should be held in frictional engagement with each other, so that, when the main lever is moved, the others move with it, but either of them, of course, can be moved independently for balancing the different circuits over the entire wave band. A pointer on the main tuning lever registers with long sheets on either side. One of these sheets is printed with a list of high-power stations and, as individual receivers vary slightly in tuning, it is only necessary to carry a pencil line from the station name to the point where it comes in on the scales. The other sheet is left blank for logging. The chassis is one unit and, by removing the tube cover and taking out four screws, the set is bared for inspections or adjustment. The cabinet is of metal and effectively shields the wiring so the tuning is sharp.



Radio Receiver Resembling a Cash Register Has Levers for Tuning the Condensers

Directional Effects from Outdoor Aerials

Many radio fans have noticed that long outdoor aerials have slight directional



Getting the Benefit from the Directional Quality of Outdoor Aerials

tendencies. The signal from a long-distant station seems to come in better if it is directly in line with the aerial and the end of the aerial farthest away from the lead-in points toward it. With this in view, four separate aerials, at right angles to each other, and having separate lead-in wires, may be erected as shown in the drawing. The lead-ins are attached to the points of an induction switch as shown. The switch lever is connected with the aerial post on the receiver, and then, by merely moving the lever, any one of the four aerials can be used. By running a jumper wire across the points, any pair or all aerials can be connected to the set.

Simple Lead-In Arrangement

Bringing the lead-in through the window to the set, often puzzles the radio fan and seems to be the hardest problem to solve. There are several methods in use, such as drilling a hole in the glass, or through the sash or window casing, but each defaces the building and entails quite a bit of hard work. A simple method is to provide a strip of wood the width of the window and two or three inches high; this is drilled to take a porcelain insulator and is then set on the sill under the sash.

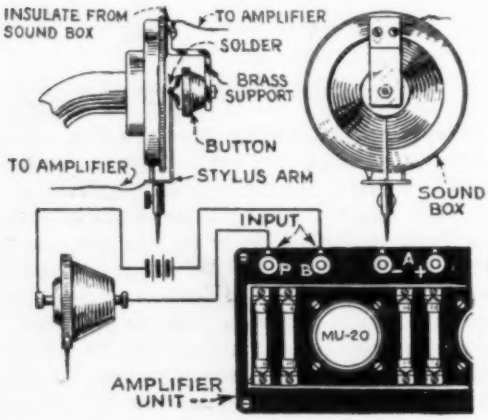
Orchestras in Japan Have Many Unusual Instruments and the Players Are Seated on the Floor; the Microphone of JOCK Being Specially Located for These Performers

Japan's Largest Broadcasting Studio

Station JOCK at Nagoya is Japan's largest and most popular broadcasting station. It has a 6-kw. transmitter and can be heard regularly on the western coast of the United States. The studio is equipped and arranged in both European and Japanese style.

Combining Phonograph with Radio Amplifier

Bringing the old phonograph up to date by combining it with a standard radio amplifier unit costs little and is well worth while. The newer phonograph records are electrically cut and have fuller tone and greater depth than the old type, but in order that the full tonal values be reproduced, a means of amplifying without distortion is necessary. A three-stage resistance-coupled amplifier unit is ideal for this purpose. Two MU-20 or high-amplification tubes should be employed for the first two stages, and a MU-6, or power tube, for the last stage, with proper C-battery. Such a unit, relatively inexpensive, will provide faithful amplification and volume sufficient for the largest living room, in conjunction with a good cone speaker. The pick-up device for converting the needle vibration into electrical variations consists of a small microphone known as the Skinderviken button. The diagram shows the connections for the button and how it is mounted on the tonearm of the phonograph.



Above, Front and Side Views of Tonearm with Button in Position; Below, Wiring Diagram

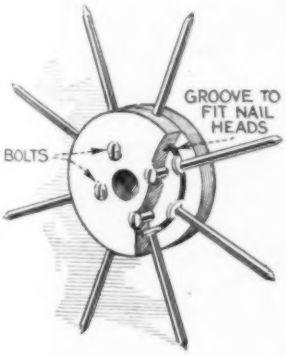
How to Check R. F. Tubes

Of late many builders of radio sets are eliminating the detector jack because of the importance of using less wiring. This, of course, is an advantage, but has one drawback in that no provision is made for checking the r. f. tubes under operating conditions. Tubes, as they are turned

out today, are faulty in many cases and detection of these faults is difficult unless some means is provided for determining the quality of the signal as delivered by the detector tube. It is also a fact that many tubes do not make good r. f. amplifiers, and if distorted or weak signals are supplied by these tubes to the detector, poor results are sure to follow in the a. f. stages, no matter how good these stages may be. Experience has shown that, out of a dozen tubes picked at random, only two or possibly three will be good r. f. tubes. If no detector jack is provided, in the set, the operator may check the tubes by connecting a double-circuit jack in the detector output, or, for temporary checking, the phone-cord tips may be placed under the plate post of the detector tube and detector B-battery terminal, thus cutting out the audio stages.—L. H. Georger, Buffalo, N. Y.

Convenient Coil Form

For making spiderweb coils the form shown in the illustration will be found useful. It consists of two circular wooden blocks, about 2 in. in diameter, although they may be larger or smaller to suit the coil you wish to wind. Cut a groove in one side of each block to accommodate the heads of nails, and fasten the blocks together with screws or bolts so that the grooves are on the inside. Drill holes from the edge to the center of the blocks for nail shanks and be sure to space them apart equally. Then take the blocks apart, insert the nails, screw the blocks together again, and drill a hole in the center of the blocks, which completes the form. The construction may be simplified by using short lengths of brass rod instead of nails, and in this case it is not necessary to cut grooves in the blocks.—Arnim F. Reeves, Groton, N. Y.



Dull Finish for Panels

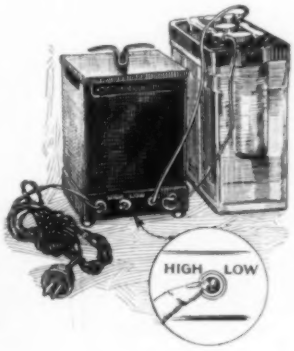
A novel satin finish on radio panels, which shows traces of circular rubbing,

Simple Homemade Tool for Giving Radio Panels a Dull Finish

can be had by using the tool shown in the drawing. It consists of a hardwood disk with a shank that will fit a carpenters' brace. A leather disk of the same size is glued on with waterproof glue and its surface is roughened with a file or fine sandpaper. Powdered pumicestone, moistened with water or oil, is used as an abrasive, the leather face of the tool being dipped in it and the tool then applied to the surface of the panel, rotating it evenly. The dull circles made in this way give the panel a very attractive appearance.

Booster Charger Has High and Low Rate

The combined trickle and fast-rate charger shown in the illustration supplies a much needed means of quickly bringing back the A-battery to full charge, if the trickle charger should fail to meet an unusual drain on the battery. The toggle switch shown in the detail permits a quick change from a charging rate of ½ to 2½ amp., as required.



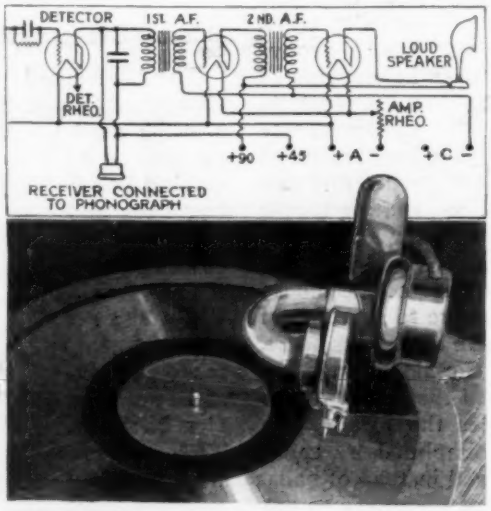
Radio Apparatus, Coupled to an Oscillograph, Is Used to Locate Noises in Automobile Motors

Radio Detects Automobile Noises

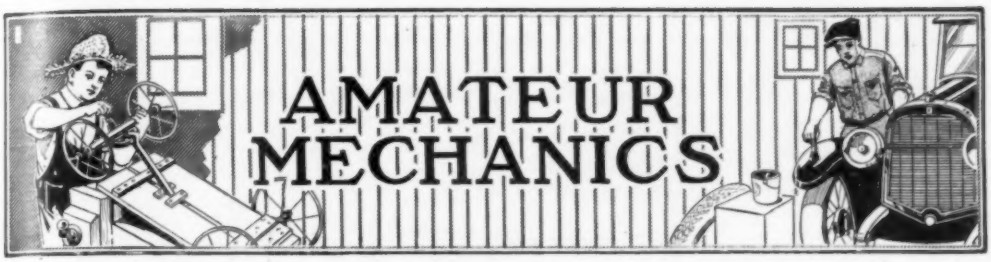
Visitors at an automobile demonstration in Detroit saw, projected on a screen, the shape that sound waves assume. It showed in popular form the more delicate and elaborate apparatus used for locating automobile noises. To study them it is necessary to reproduce the sound waves faithfully on a photographic film, where they are measured. The data are used to trace the noise to its source. The apparatus in the testing laboratory consists of three distinct units: the microphone, the amplifier and the oscillograph. The microphone picks up the noise vibrations in the air and changes them into pulsating electric currents. The vacuum-tube amplifier magnifies these currents until they become strong enough to actuate the delicate element of an oscillograph. During this step, the current must not be distorted in the slightest degree. In the oscillograph, a tiny spot of light reflected from the moving element vibrates back and forth across the photographic film, which is placed on a drum. After development, the film shows a trace representing the wave form, intensity and pitch of the sound picked up by the microphone. Ordinary radio equipment is not accurate enough for this work, and each of these devices must be specially built for the purpose. Noise hunting in cars is difficult because vibrations may be "telegraphed" from one member to another, and thus there is always the danger that the wrong member will be accused of making the noise. It often happens, too, that, when the real source is found, the changes necessary to eliminate the noise, cannot be made. In such cases, one or more of the members through which the noise is being telegraphed are changed so that they will no longer respond to the vibrations.

Reproducing Phonograph Records through Radio Set

The tone quality of phonograph music can be improved by fitting an earphone to the tonearm, connecting it with the audio amplifier of a radio set, across the primary winding of the first a. f. transformer, as shown in the diagram. This arrangement gives much more volume than the phonograph alone, which makes it especially suitable for use in halls. The loud speaker can also be located a considerable distance from the phonograph, which may be convenient on many occasions.



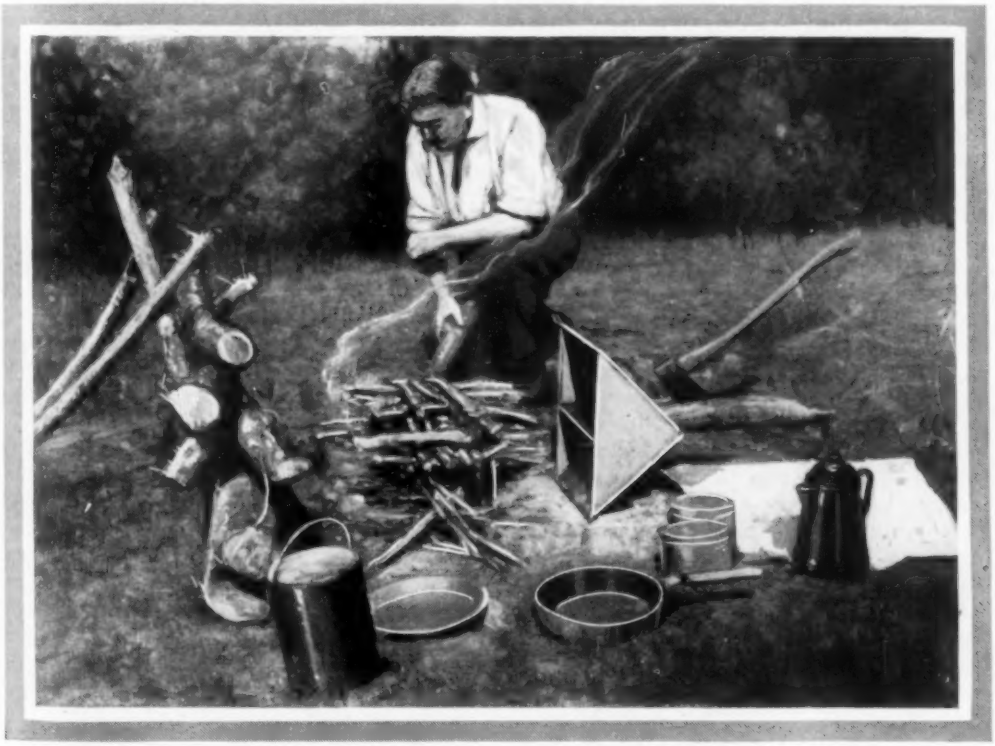
Arrangement for Reproducing Phonograph Records through a Radio Receiver



How to Make a Camp Baker

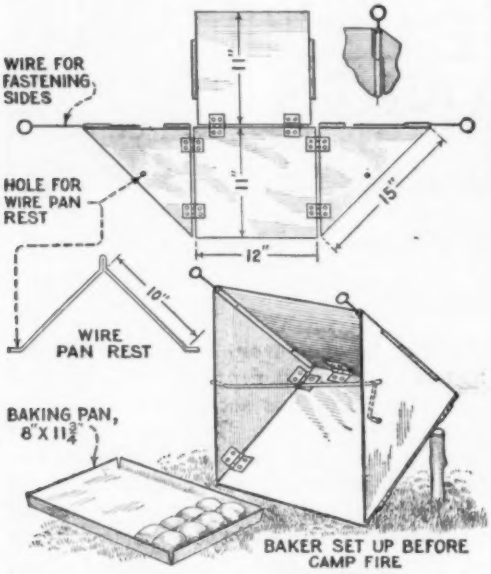
By C. P. FORDYCE

ONE mark of the efficient camp craftsman is that he be able to make good meals from scanty food supplies. Perhaps nothing is so trying as to attempt to make good breads with the limited utensils at hand. In the north woods the reflecting baker of aluminum or light tin is the most popular style for all kinds of baking and roasting. It consists of two flat metal surfaces set at an angle with ends closed to hold the heat, and with the flare or open front before the leaping flames of a camp fire; in the center of this angular unit is set the bake tin with its batter or dough. The heat from the camp fire hits the polished flat upper surface and is thrown down upon the top of the breadstuff and from the lower up against the bottom of the bake tin. Being of thin-gauge sheet metal and folding flat, the reflecting baker weighs but a few ounces and is easily carried in the pack.



How the Reflecting Baker Is Used; Note the High Fire and the Back-Log Reflector, and How the Baker Is Supported to Throw the Heat against Both Sides of the Pan

You can make one of these bakers at home and for this you will need a piece



Details of Construction of the Reflecting Camp Baker and the Baking Pan

of tin, 12 in. wide and 33 in. long; half a dozen small hinges, a pair of tinners' shears and a punch, two dozen tinners' rivets and a hammer. Cut the tin into three rectangles, 12 by 11 in. on the side, and use two to make the top and bottom of the reflector. They are hinged together so that they will fold like the covers of a book. The sides are made by cutting the third piece of tin diagonally across, producing two triangular sections, which are both hinged to the bottom piece of the baker. Lugs are formed on these, and on the top piece, as shown, to take a piece of wire that locks the baker when open. Near the center of the sides punch holes for inserting the ends of the wire pan rest. When you wish to use the baker, drive two small stakes into the ground and rest the rear edge of the baker on them. The bake pan can be made of another piece of tin if not purchased; the dimensions are from 8 by 10 in. to 8 by 11¾ in.

The special points about the fire for the reflector are that it must be built high and preferably with a back log reflector. A low fire burns the lower side of the biscuits before the upper side browns. The best woods to use are hickory, hard maple, oak and birch. Later these will burn down to a fine set of coals which can be utilized for another cooking. The regulation of the heat is done by moving the baker to or from the fire and by laying a green log on the ground before the tops of the biscuits are done. The secret of success of the camp baker is the envelope of hot air, which must not be too hot and which must be kept even. Practically all of the commoner recipes in baking and roasting can be used.

"Digging" Worms with Electricity

On a recent fishing trip, I found it difficult to get worms, so I took two electric-lighting wires of opposite polarity and connected each one to a screwdriver to make good contact with the shank. These I stuck into the ground about 4 or 6 ft. apart and then turned the current on. In a short time, the worms came to the surface so that they could be picked up.—E. W. Carroll, Portland, Oreg.

Combination Lamp and Picture Frame

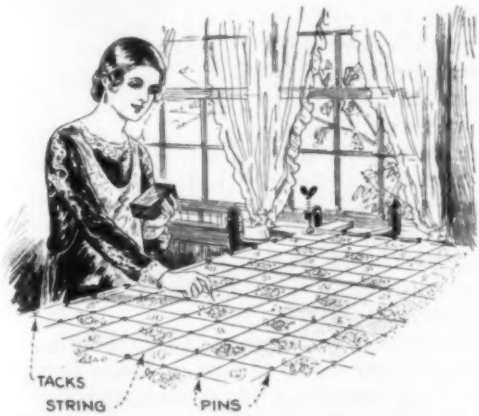
Novelty lamps of various designs are quite popular nowadays, and the one shown in the photo will perhaps strike your fancy. It is a dresser lamp and serves the additional purpose of holding a photo. It consists of a base and two standards, on the end of which miniature sockets are mounted for lamps of the design indicated. The standards are drilled lengthwise to accommodate the lampcord, which leads to each socket, these being connected in parallel in the base, which is drilled for that purpose. The connections should be well soldered and taped. The picture frame is pivoted between the standards.—B. J. Jakaitis, Chicago, Ill.

Lock for Ford Coupe

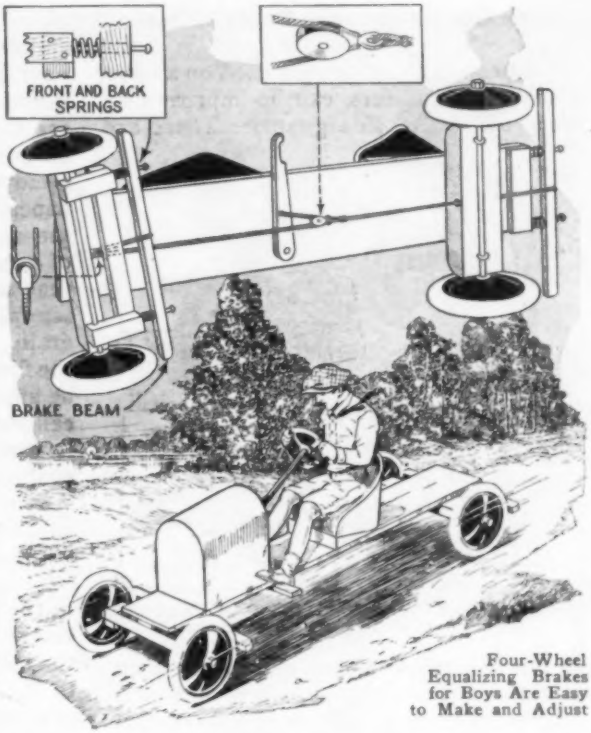
To prevent thieves from stealing things from the rear end of his Ford coupe, one owner put on a latch which could only be opened from the inside of the car. After the latch is closed and the doors are locked, the rear end cannot be opened unless pried. A small wire leads from the latch to the left side of the cushion and fastens to a ring, which prevents it from slipping back and also serves as a handle. When the wire is pulled the latch is released. To make it work automatically, a spring in the latch pushes it back again and locks the rear end as soon as the wire is let go.—R. E. McNatt, Beaumont, Tex.

Locating Knots on Quilts

In making comforters, the work of locating the various equidistant points where knots are sewed on, can be simplified by using string as shown in the illustration. The length and width of the quilt are divided into equal spaces along the supporting frame and tacks inserted at each mark. Twine or yarn is strung across the quilt from tack to tack to weave a sort of lattice and pins are inserted through the quilt at each intersection. The string and tacks are then removed and the work of tying may be accomplished in a short time.—G. E. Hendrickson, Argyle, Wis.



Simple Method of Locating Correct Position of Knots on Quilts or Comforters



Four-Wheel Equalizing Brakes for Boys Are Easy to Make and Adjust

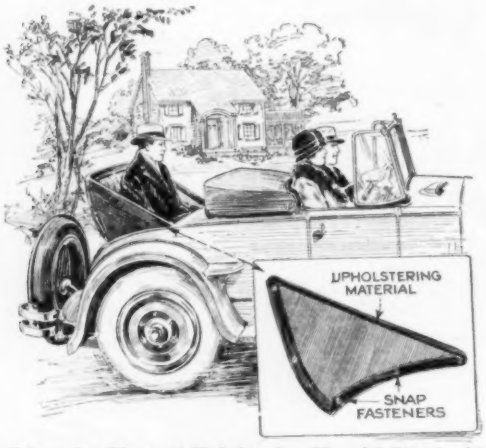
Four-Wheel Brake on Boy's Coaster

Boys who make their own coasters will find it useful and interesting to provide a four-wheel equalizing brake as shown in the drawing. It consists of two crosspieces attached to a specially made wooden frame by means of steel bolts. Small coil springs are slipped over the bolts, between the crosspieces and the frame, to keep the former from touching the wheels when the brake is not applied. Both the front and the rear crosspiece are provided with a length of sash cord, one being run through pulleys and attached to a foot lever and the other fastened to the eye of the central pulley, as shown clearly in the details of the illustration. By forward pressure on the lever, which is pivoted to the underside of the car, the brakes are applied.—Hi Sibley, Los Angeles, Calif.

¶Two shotgun shells, one of 12-gauge and the other of the 16-gauge size, make a neat and useful matchbox for the huntsman; the larger shell fits snugly over the smaller one, making the box practically waterproof.

Side Guards Improve Tonneau Seat

Tonneau seats, which are used on a large number of roadsters, can be improved by the provision of side guards. These are



Triangular Pieces of Upholstering Material Fitted with Snap Fasteners Improve Tonneau Seat

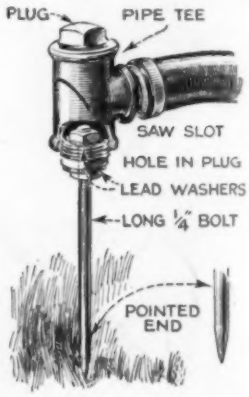
simply triangular pieces of top covering, or upholstering material, edged and provided with eyelets to fit snap or turn-type fasteners which are driven into the seat. Besides helping to keep out dust and draft, they add to the appearance of the tonneau seat.—G. A. Luers, Washington, D. C.

How to Calk a Small Boat

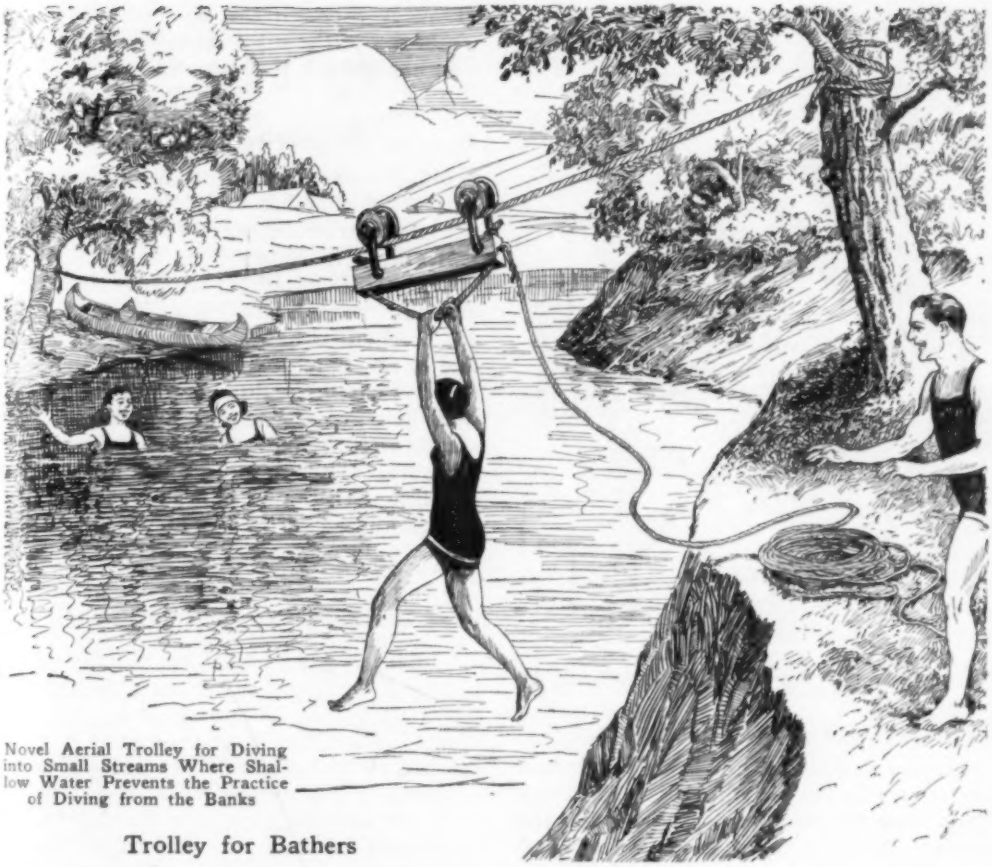
Wooden boats are prevented from excessive leaking by calking between the planking. This consists in driving in some suitable material between the planks so that it will be held firmly by the swelling wood and will close the seam to make it water-tight. The paint later applied also acts as a binder. In calking, the first operation is to smooth off the outside of the hull with the plane and sandpaper; then prepare the calking material, either oakum or spun cotton. Pull out and lightly twist enough of the material to lay in a few feet of the seam. Then, with a calking tool, drive in the material by placing the edge of the tool on the material and tapping the handle with a hammer. Drive it in well but not hard enough to spring the planking or split it on the inside. If the seam is narrow, it may be necessary to lubricate the calking material slightly with graphite. If the seam is too tight, open it with a chisel. One seam should be finished before commencing the next, and no calking material left projecting above the surface of the hull. When the calking is done, the hull should again be gone over with a small block plane to remove all the rough spots and then sandpapered. For boats that are to be painted, the sandpaper can be rubbed crossways of as well as with the grain, but for boats that are to receive a varnish finish the sandpaper should be rubbed only with the grain. First use the rough grade and then the fine. The priming coat of paint should be applied well into the seams to bind the calking material to the wood and prevent it from "spitting" out. When the final coats are applied, the seams will be well covered so that they are invisible. In calking old boats, be careful not to start the planking by too severe use of the calking iron and do not chip off the soft edges of the wood. Cotton soaked in linseed oil makes a slightly better job as the oil fills the pores of the wood and binds the cotton to it. An old hull should be dried out for several hours before calking it.

Simply Constructed Lawn Sprayer

A simple and practical lawn sprayer, consisting of a gaspipe tee, two plugs and a carriage bolt, can be made in a few minutes. One of the plugs is drilled to receive a ¼-in. carriage bolt, 10 in. long, and from this bolt the head is clipped and the shank filed to a sharp point, as indicated. A rubber or lead washer is used in assembling the bolt and plug to make a watertight joint. The plugs are screwed into the tee after an angular slot has been sawed in the latter, as shown.



With the hose attached and the sharpened bolt inserted into the ground, the sprayer is ready for use and, in operation, will provide the wide mistlike spray so desired for the watering of lawns and gardens.



Novel Aerial Trolley for Diving into Small Streams Where Shallow Water Prevents the Practice of Diving from the Banks

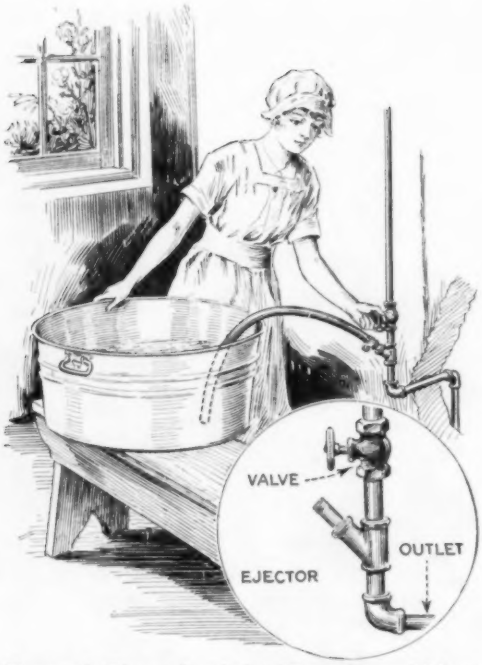
Trolley for Bathers

If you go swimming in a narrow river where it is impossible to dive from the banks, rig up a trolley over the stream, as shown in the illustration. A strong rope is securely tied to a tree on each bank, one end higher than the other. The trolley consists of a piece of 2 by 4-in. stock to which two wooden pulleys are attached by means of U-shaped hangers. An ordinary bolt is slipped through holes drilled in the end of these and washers are placed between the sides of the hangers and the pulleys. A rope handle is provided for the rider, being fastened to the trolley as shown, and a long rope is tied to the latter so that it can be pulled back to the starting position. The rope should be coiled to prevent it from being tangled when the trolley takes off.—Dale R. Van Horn, Lincoln, Nebr.

Simple Repair for Leaky Drain Pipe

Many small repair jobs around the house can be done with cement. A leaky drain pipe from a kitchen sink was fixed by this means. In this instance the lead pipe, which ran down through the floor, had broken loose where it was joined to the cast-iron pipe and also had a hole, about ¼ in. in diameter. Narrow strips of cloth, soaked in a thin mixture of cement and water, were wound around the joint. A few turns of some light wire around the cloth served to reinforce it, and another layer of cloth and wire was applied for good measure. This repair has lasted for over two years and it still remains in perfect condition.—J. H. Edwards, Huntington, W. Va.

¶ To remove a cork from a bottle drive a screweye into it, and if the bottle has to be uncorked frequently, leave the screweye in the cork.



Homemade Ejector Attached to Water System Lightens Labor on Wash Days

Ejector for Emptying Washtubs

Carrying tubs of water is a difficult task and emptying them by buckets takes time. This work can be eliminated by using the ejector shown in the drawing, which acts as a siphon. Run a length of ¾-in. pipe from the water main down the wall, vertically, and fit a valve on the end. A short nipple is screwed into the valve, a Y-fitting is added and then another length of pipe, which leads to the drain. A short nipple is screwed into the Y-fitting and a length of hose is attached as shown. The Y-fitting should be lower than the bottom of the tub when standing on a bench, in order to make the ejector work effectively. When a tub is to be emptied, place the end of the hose in the tub near the bottom and turn on the valve. The rush of water through the pipe will suck the water out of the tub. After the siphon action has started, the valve can be closed.

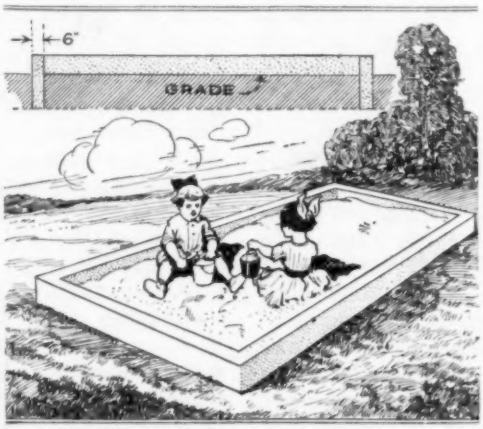
Reclaiming Old Paint

Many amateur painters have wondered why paint that has stood for a time in a can, more or less exposed to the air, creeps and crawls in spite of the best efforts in brushing it over the surface painted. This action, though troublesome, is not due to the method of handling the brush, but is due to too much exposure to the air.

What should be done is to mix the paint with benzine or gasoline and allow it to stand, after being well stirred, for a day or more. Then pour off the benzine or gasoline with the oil and add a fresh supply of linseed oil and a little more drier than would ordinarily be used.

Sand Box for Children Built of Concrete

Children's sand boxes are usually made of wood, but concrete gives a better appearance and is, of course, more durable. The box should be large enough to accommodate several children. In building one, a trench is dug to a depth of about 18 in. and wide enough to receive wooden forms made of ¾-in. material. The stakes, which are lengths of 2 by 4-in. wood, should not be over 3 ft. apart. Care should be taken that the top of the form is level and that the inner surface is as smooth as possible. The form should be drenched before it is filled. About 1¼ cu. ft. of concrete will be required for each running foot. A box 15 ft. long and 5 ft. wide will require 48¾ cu. ft. of concrete. The mixture is made in the proportion of 1 sack, or 1 cu. ft., of cement to 2½ of sand and 4 of pebbles, ranging from ¼ in. to 1 in. in diameter. All told, about 10 sacks of cement, 25 cu. ft. of sand and 40 cu. ft. of pebbles will be required. The next

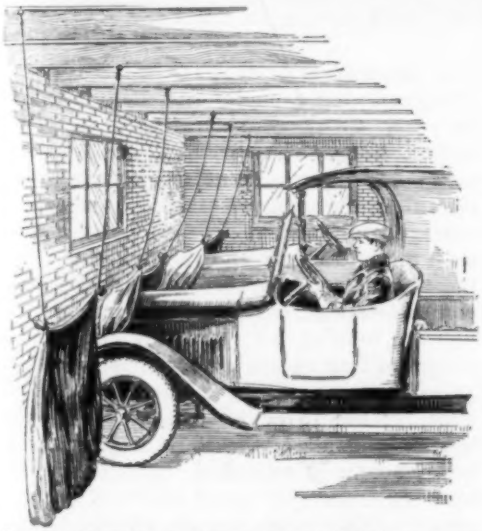


Concrete Sand Box for the Children Is Neat-Looking and Durable

day after the form is filled it may be removed and the surface of the wall troweled with a small amount of cement and sand in the proportion of 1 to 2. Before the mortar has hardened, the entire surface should be painted with a well-stirred mixture of cement and water of a creamy consistency, which may be applied with an old paintbrush. The wall should be kept damp for several days and may be covered with wet burlap, straw or building paper to protect it from the sun. The sand box is filled, to a depth of 9 to 18 in., with clean, white sand in which children will enjoy playing. A concrete floor is not necessary, but if desired, provision should be made for draining it.—A. J. R. Curtis, Chicago, Ill.

Auto Radiator Automatically Blanketed

A Wisconsin merchant who keeps several delivery cars in a small, unheated garage at the rear of his store, found that, while the blanketing of the radiators between trips preserved the heat of the engines so that the starting was made easier and required less fuel, the crowded park-

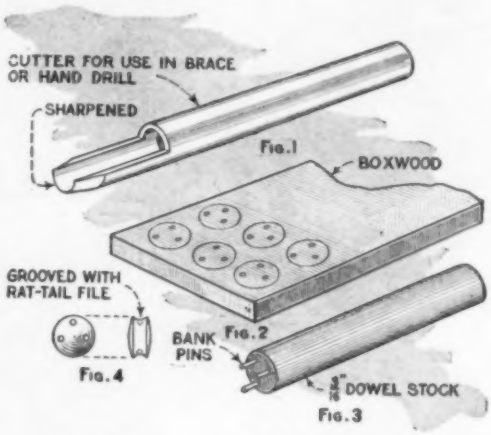


Blankets Hanging in Garage Automatically Drop Down and Cover Auto Hoods

ing space in the building made the task rather difficult, and the drivers often neglected it. To overcome the trouble, blankets are hung from the ceiling, so that, when a car is driven into its space, they automatically cover the radiator and front.

Making Deadeyes for Ship Models

One of the jobs that daunts the amateur ship modeler is the making of the numer-



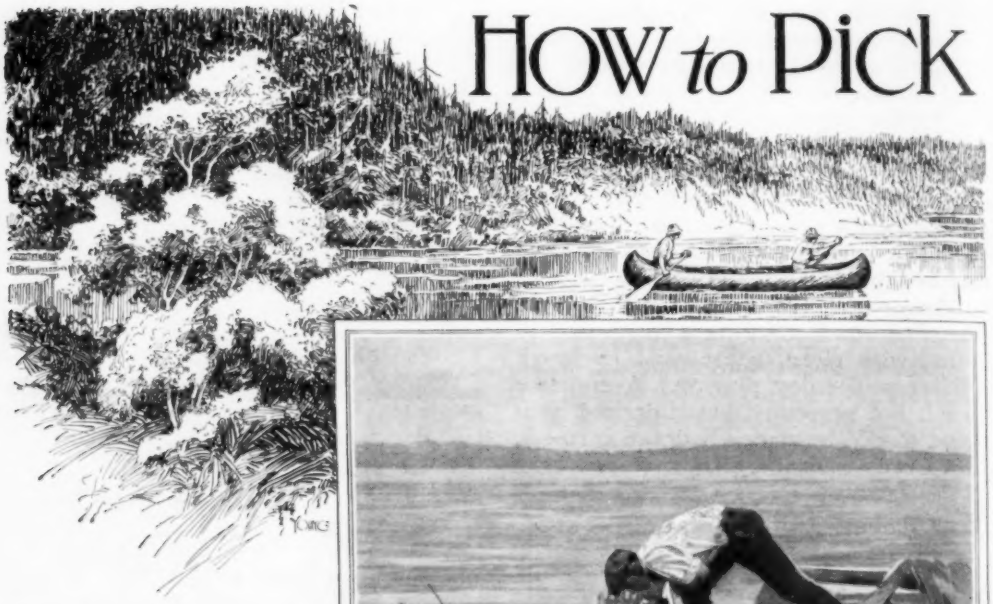
ous deadeyes required for the standing rigging. With a couple of simple tools, however, this job can be robbed of its terrors, and enough deadeyes for the average ship can be made in a single evening.

The first tool is made of a short length of ¼-in. drill rod; a 3/16-in. hole is drilled along the axis, as shown in Fig. 1, and the end is then ground to the shape shown, and sharpened to a good edge on the oilstone. The deadeyes are made of boxwood, old scales or rules providing the material, and they are marked on the wood, as indicated in Fig. 2, using a light hammer to outline the circles with the tool. The next step is to drill the holes for the lanyards, and, in doing this, be sure to lay out and drill the holes as shown in Fig. 4. The tool is now mounted in the brace or hand drill and the deadeyes cut out.

The next tool is a short length of 3/16-in. dowel stock, Fig. 3, into the end of which has been driven three bank pins, spaced so as to fit the holes in the deadeyes, and cut off so that they do not project through the latter. With a deadeye mounted on the end of this tool it is easy to sand the curve on the face and to cut the groove around the edge, using a rat-tail or a triangular file for the latter operation.—L. E. Davis, Syracuse, N. Y.

¶Scorch marks on linen may be removed by rubbing with a freshly cut onion and afterward soaking in cold water.

How to Pick



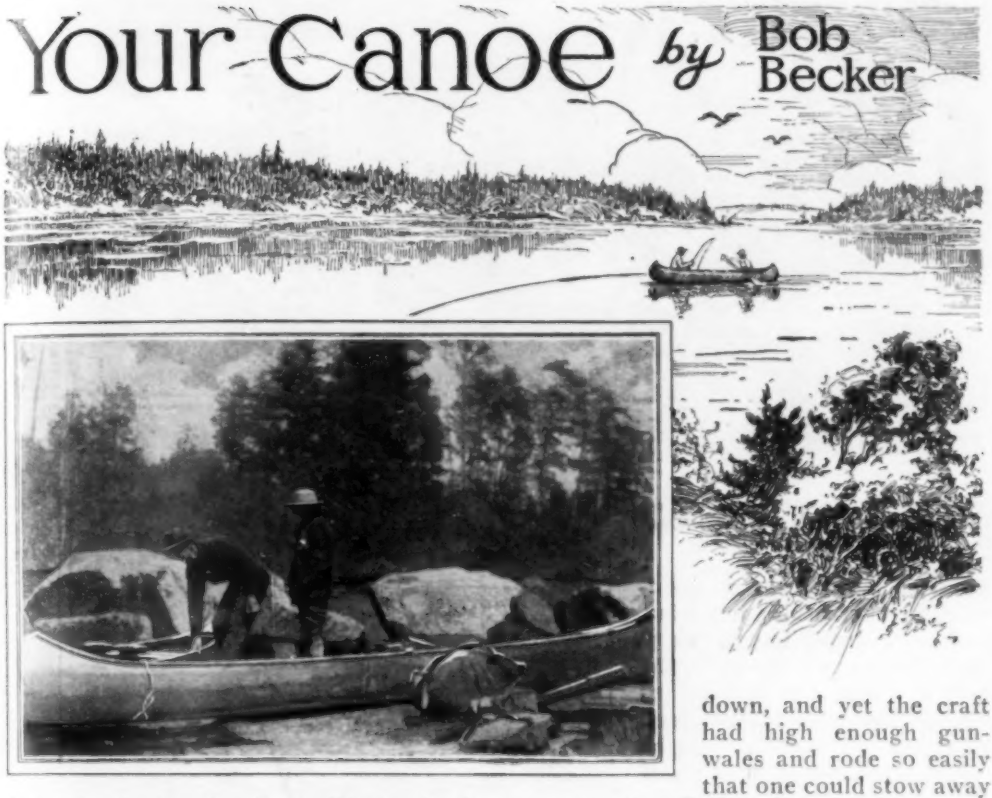
TO the inexperienced canoeist all canoes look pretty much alike, but there are on the market a wide variety of models, many of which are made for special purposes; so it behooves the beginner in canoecraft to "watch his step" when he strolls into a sporting-goods store to buy his first canoe.

Shape, length, breadth and weight are the four factors that must be kept in mind when selecting your canoe for lake or river use. I have found that the best way to get these four factors impressed in one's mind is to stand in front of several racks holding canoes and then check on these factors by an inspection of each model. For example, you may see a short, compact, speedy-looking little craft that looks "cute"—so attractive, in fact, that you want to buy it at once. That is the way I felt when I first saw a 12-ft. one-man "boat." But it is not adapted for general canoeing, for you and your guide to go fishing in. It is a one-man outfit, a specialized craft limited in carrying capacity and stability. In this manner you learn that flat-bottomed, wide canoes are more stable, but not so speedy as narrow round-bottomed craft.

Most canoeists, and especially those who pack up their duffle and make fairly long trips on a river or through a lake region, want carrying capacity and stability, with speed a third consideration. In other words, when one turns explorer by water and takes along a complete camping outfit, the craft must be steady, have ample storage room and at the same time paddle with ease. Length and width are the two most important factors in deciding seaworthiness and carrying capacity. So, if you are looking for a cruising canoe, you must not buy or use a short narrow craft.

To illustrate this basic rule of canoe use, consider the 15 or 16-ft. boat of narrow beam alongside of the 16 or 17-ft. craft of wider beam. You'll find that the shorter boat is relatively unstable and pretty tricky when you try to pack anything in it, or fish from it. On an average, a 16-ft. canoe weighs in the neighborhood of 65 lb. It is apt to run closer to 70, although last summer I used an all-wood seventeen-footer that weighed (when dry) but 65 lb. All canoes take on poundage when wet. You can figure on each additional foot of length weighing about 5 lb., but

Your Canoe by Bob Becker



that extra foot makes it possible to chuck in another duffle bag, as, generally speaking, it adds anywhere from 65 to 75 or 80 lb. of carrying capacity, depending on the model. When in doubt, get the extra foot of length, as it's an investment in comfort and safety. The average man has no hankering to cruise for days with the gunwales of his canoe too close to the water, when, by adding a foot in length, he can rest easy.

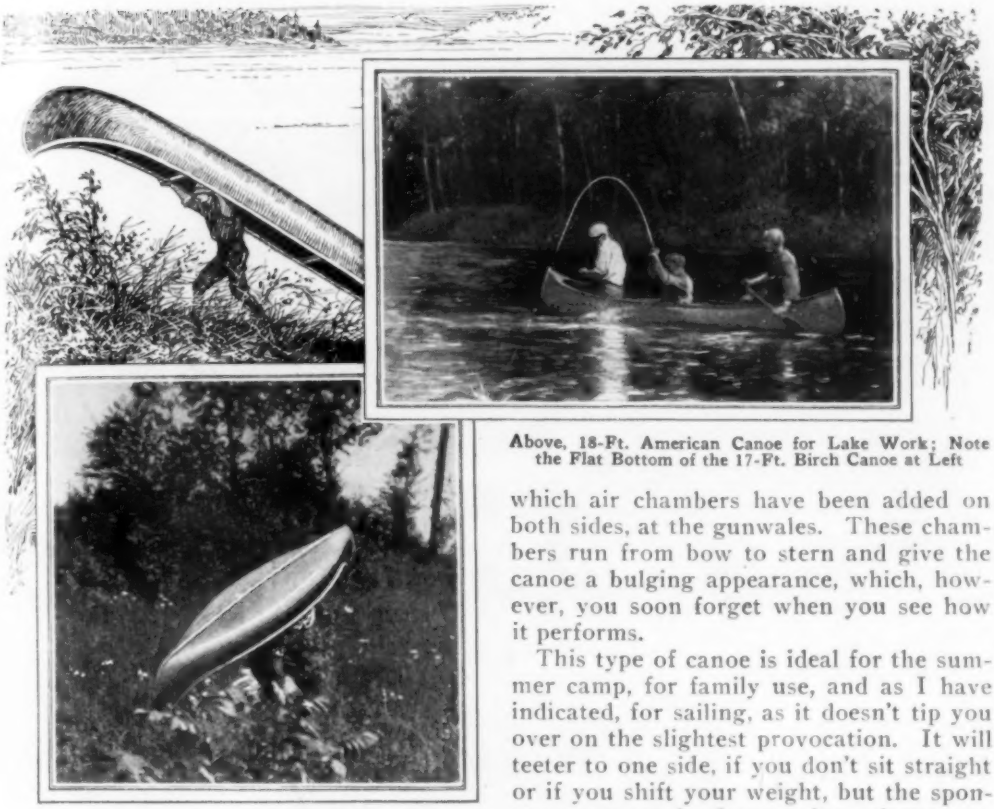
After an arduous canoe trip through a virgin wilderness lake region last summer, where there were many portages and fairly heavy loads to consider, I am ready to advise the 17-ft. flat-bottomed, all-wood canoe as an ideal "buy" for the man who wishes a cruising canoe that is light, steady and able to carry a good load. Here was a trip with rapids to be run, which introduces the possibility of an occasional collision with a bowlder, and a lot of duffle to be transported. To meet these requirements I found a canoe that was broad-beamed and steady, with ends that were not too high, so that windage was cut down, and yet the craft had high enough gunwales and rode so easily that one could stow away an exceptionally heavy load. Another feature of this canoe, one which you may want to consider if you are going to put your outfit through a pretty rough trip, was the all-wood construction. Made of three-ply birch, it surprised me to see how it would run on a sharp rock without a puncture. Instead of a jagged hole resulting from such an encounter, the pliable birch would give, and, barring the removal of varnish from a spot on the bottom, the canoe would be undamaged. For fishing, this seventeen-footer was ideal because it had short covered decks at each end. As you look at a canoe in a sporting-goods store, you may not give this feature a second glance. But here is how I found these two compartments useful. There was just enough room in the covered space at the prow to keep my fly book, reel, rain-shirt and tobacco pouch, and when it rained, I could reach for the shirt without worrying about the rest of the outfit, as it had protection.

The seventeen-footer I used for cruising and wilderness travel last season had

Two Views of a Good Wood-and-Canvas Cruising Canoe; It Has a Shallow Draft and Is Easy to Handle

no keel. This was a disadvantage when fishing in a wind, as it was almost impossible to hold the canoe against the breeze. The combination of flat bottom and shallow draft gives you no purchase on the water, especially without a keel. To get deeper draft, so that the canoe will keep its course more readily in a wind, you will find experienced lake canoeists turning to a different type. Lake work means wide stretches of open water upon which a wind has an unobstructed sweep, and in this situation you will find the round-floored canoe quite popular. Thousands of round-bottom wood-and-canvas canoes have been bought and are being used on lakes, because they are the most efficient paddling "Injun-style" boats to be had. But my tip, after rocking around in many canoes of this type, is to get plenty of length and a broad beam in your lake canoe, together with the round bottom. There is a decided tendency to roll in this type of craft, as you would expect in any with a round bottom. To counteract this, you again need length and width, those two faithful allies of stability. In the case of a lake canoe, there is apt to be little portaging, and hence you do not have to figure on weight so closely as you do in choosing an exploring ca-

One of the "Two-Man" Nipigon Canoes of Canada, an Ideal Craft for Use on Heavy Trips in Swift Waters



Above, 18-Ft. American Canoe for Lake Work; Note the Flat Bottom of the 17-Ft. Birch Canoe at Left

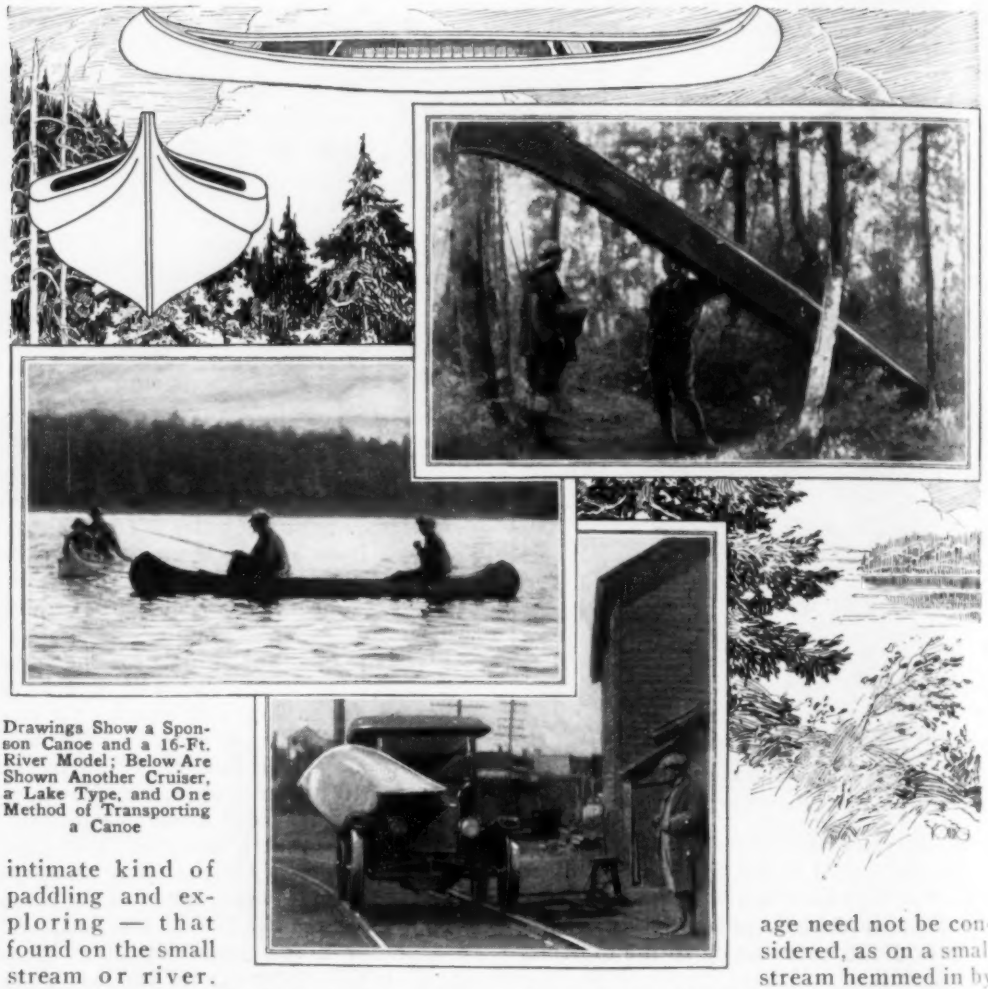
noe. So buy an eighteen-footer for lake work and avoid those that have ends so high that they look like Venetian gondolas. On a windy day, those high ends act like sails, and add enormously to the difficulty of steering.

If you want a "family" canoe, one for sailing, or one in which you don't have to watch your step every minute, don't overlook the sponson canoe, which is the safest craft in the whole canoe family. Every outdoor fan who likes the water is ready to call the average canoe temperamental—and that's just what it is. Some are more so than others, but all have to be handled with care and none will brook many liberties. But the sponson is different, and this is the reason why: It is a canvas canoe to which air chambers have been added on both sides, at the gunwales. These chambers run from bow to stern and give the canoe a bulging appearance, which, however, you soon forget when you see how it performs.

This type of canoe is ideal for the summer camp, for family use, and as I have indicated, for sailing, as it doesn't tip you over on the slightest provocation. It will teeter to one side, if you don't sit straight or if you shift your weight, but the sponsons prevent it from going clear over. You will find that a canoe of this type weighs considerably more than an ordinary canvas or all-wood canoe of the same length, and because of this fact it is not suitable for a trip requiring many portages. It's a family canoe; the last word in safety for camp and lake purposes.

Now let us see what to buy for a more

Here Is a Good Cruiser Type for Two Men, Especially Were Many Portages Are Encountered



Drawings Show a Sponson Canoe and a 16-Ft. River Model; Below Are Shown Another Cruiser, a Lake Type, and One Method of Transporting a Canoe

intimate kind of paddling and exploring — that found on the small stream or river. Although a 17-ft. flat-bottomed wood, or canvas-and-wood, canoe will serve very well, as such a craft is at home in almost any kind of water, the very best type of canoe for winding, twisting streams that are comparatively narrow is the one that is short and of fairly narrow beam.

I have had this fact driven home on a trout stream in the north woods. This stream flows out of a big spring hole tucked away back in the timber about a mile from a lake into which it flows. The stream winds and twists through the timber, broadening here into a pool and there rushing over rocks to make a riffle. To make quick turns, to get around the "corners" of that stream, you need a rather short, narrow canoe, one that obeys a flick of the paddle and responds instantly. Windage need not be considered, as on a small stream hemmed in by dense forest, the breezes get little or no sweep. Nor is carrying capacity important, for one does not ascend the stream for a day's fishing with heavy tents and duffle, such as are carried on a long cruising trip. You will find that outdoorsmen naturally turn to a 16-ft. canoe for small-stream work. Sometimes they pick a canoe that is 31 in. wide, sometimes a 36-in. beam is chosen. But always the bottom should be flat for this work, as the idea is to get a craft that draws as little water as possible.

If you want a canoe that will do for lake work as well as small-stream work, one of the above-described type is not suitable, for it is not adapted for open-water work. Most outdoorsmen, facing the problem of a so-called all-around boat, will select a

17-ft. flat-bottomed canoe. Such a craft is not unwieldy on a small stream.

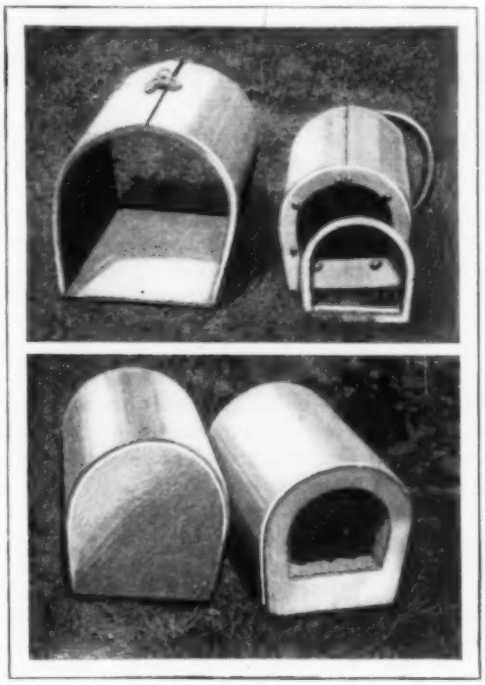
Occasionally the outdoorsman has need for a large, two-man canoe with exceptional carrying capacity—a boat for freighting or long-distance traveling on pretty good-sized rivers. This demand has brought into use one of the most unusual and serviceable canoes to be found anywhere. It is the giant wood-and-canvas canoe widely used on the Nipigon river in Canada, where swift water requires two paddlers and the trip involves large loads. On a long river trip in the north, where two men would be on the water for several months, with few portages, this type of canoe is ideal, and every outdoorsman should know about it. The boat is so wide of beam that two small persons can sit side by side. It is such a carry-all, that two passengers, two paddlers and hundreds of pounds of baggage can be transported without trouble. Moreover, it takes the rough water like a bird. We have shot swift long rapids in this "taxicab" of the canoe family without trouble and without getting wet.

Sooner or later, the beginner in canoecraft must face the question: Which should I buy, a canvas or all-wood canoe? These are the two general classes of canoes on the market today. In the case of the former, you have a boat made by covering a framework of wood with canvas. It is not an all-fabric boat as the name would imply. If you want speed in your craft, better stick to an all-wood canoe, as they are, generally speaking, faster than the wood-and-canvas models. Yet, in spite of the all-wood type's speed and general practicability, the wood-and-canvas craft is more popular with Americans.

If you like the sport of sailing and want a canoe for this exhilarating fun, turn to the wood canoe and get acquainted with the most individual and highly specialized of all canoe models. Although you can turn an ordinary open canoe into a sailing craft, the special canoe is an all-wood boat, which, with the exception of a cockpit for the boss of the outfit, is entirely decked. But this is not its only distinctive feature. It is provided with water-tight compartments so that it will not sink, and it has a centerboard and a sliding seat. The need for the latter—a novelty in most boats—comes when the sailer hauls close to the wind so that his craft heels over. To keep it from going clear over, he slides out beyond the boat's side where his weight offsets the dip.

Concrete Poultry Nests

Poultry nests made of concrete will not harbor lice, if disinfected occasionally, and a poultry man who wishes to make a number of these can do so readily. The forms are made of metal, as shown, and must be oiled so that the concrete will not adhere. The mixture used is 1 part of cement to 2½ or 3 parts of sand. When the molds are arranged in position to receive the concrete, the front or open end is up and the concrete is rammed in with a ¼-in. wooden rod. A piece of ¼-in. wire mesh, or similar material, may be put in for reinforcement. After the nests are removed from the forms, they are covered with wet burlap for a few hours and then are immersed in a tank or trough for at least three days, with a moderate or warm temperature. Nests made of concrete can be easily cleaned and even burned, if desired.



Concrete Poultry Nests Are Practically Lice-Proof if Disinfected Occasionally

Office on Wheels

As manager of a new hotel, I have to travel between it and my old hotel ten blocks away. The new building is under construction and, the temporary office being dusty and dirty, I found it more convenient to use my sedan as an office when prospective tenants arrived at the new hotel. To facilitate writing, I arranged a sort of desk as shown in the drawing. It consists of a smooth board, hooked across the sides in front of the rear seat, special fittings being provided for this purpose. In the evening the lights are turned on and meals can be served if desired.—John F. Daschner, New York City.

Using a Sedan as an Office Which Is Fitted with an Improvised Desk

Pointers for the New Auto Driver

Never, under any circumstances, race your engine, especially when new. More engines are ruined by racing than are worn out by proper driving. Besides, there is no sensible reason for racing the engine, even to warm it up, as many drivers do. The engine will warm just as fast if run for a few minutes at a moderate speed as by racing it. If it is absolutely necessary to warm the engine up in a hurry, hang a sheet of paper over the radiator to shut off the air circulation.

Don't move the steering wheel while the car is stopped. This puts a very great strain on the entire steering mechanism, and it is scarcely ever necessary. There is usually room to move the car under power a few inches at least, and the steering wheel can be moved much more easily and with less strain on the mechanism when the car is moving even slightly.

Don't rush up to the place where you are going to stop and then slam on the brakes; save them for the time when you will need them more. It is just as easy, and much more pleasant for the passengers, to coast to the point where you are going to stop, and then apply the brakes gently, if they are needed at all. Gentle stopping is the mark of a good driver; "grand-slam" stops the mark of a very poor one.

If the car skids, leave the clutch engaged, and steer the car in the direction the car is skidding. That is, if the rear wheels skid to the right, turn the front wheels to the right side also. Turning them to the left will only aggravate the skid. On slippery surfaces, if it is necessary to apply the brakes, apply them gently and intermittently, and leave the clutch in while the brakes are used. This will reduce the tendency to skid.

Use the motor as a brake when going downhill. That is, leave the clutch in, and keep the throttle closed. Keep the switch on. Apply the hand and foot brakes alternately if the hill is a long one, to keep the brake linings cool and reduce wear. If the hill is a very steep one, stop at the top, change down into second gear and go down using the motor as a brake.

Don't try to pass another car on a curve, on a hill, at a street intersection, or anywhere else where the view of the road ahead is obstructed in any way. There might be another car coming in

the other direction, and if there is, you might not have room to avoid him.

Use the best oil you can buy for your engine, remembering that it is the cheapest in the long run. Follow the maker's instructions about lubricating the car faithfully; if you lubricate every part of the car twice as often as he recommends, it is all to your own advantage.

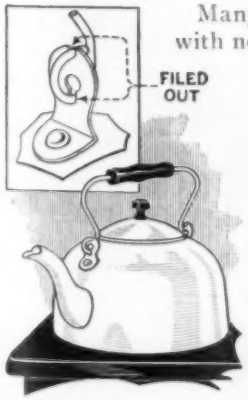
Keep your foot off the clutch pedal except when you want to throw it out. "Riding the clutch" will only result in a repair bill sooner or later.

Fill in all cuts on tires with "tire dough," to prevent moisture reaching the interior of the casing and rotting the fabric.

You will find many nuts and bolt heads on the car unpainted. Paint these at once with a quick-drying enamel to prevent rust and subsequent bad appearance. Get underneath the car and paint all the unpainted spots you can see, and while you are there, oil all the brake connections, using steam-cylinder oil, not engine oil. The heavy oil stays on and lubricates these connections better.

Tighten the body bolts after the first 500 miles and go over them every 1,000 miles after that. Examine all screws and bolts about the body periodically and keep them tight, to prevent squeaks and rattles as long as possible. Tighten up spring clips after the first 500 miles also, and after that see that they are kept tight.

Holding the Teakettle Bail



Many teakettles are made with no provision for holding the handle in an upright position, and burned fingers often result. A simple remedy for this is to file notches in each ear of the kettle, as shown in the illustration. A small round file is used for this purpose. This allows the upper and lower sides of the bail loops to enter the slots, so that the handle will be supported perpendicularly.—G. E. Hendrickson, Argyle, Wis.

To Keep a Tent Warm Overnight

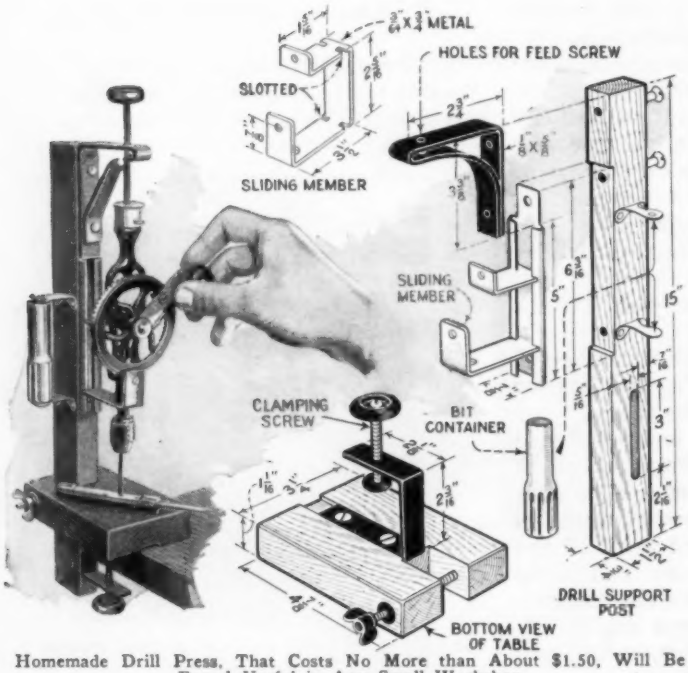
To keep a tent warm all day or night several methods can be used. One is to dig a hole in the ground inside the tent,

Heating the Campers' Tent during Cold Weather Increases Comfort

fill it with hot coals from the campfire and then cover it with an inverted bucket. If desired, the next day's ration of beans can be cooked by burying the can in the hot coals and letting it lie there overnight. To keep a slow-burning fire in a sheet-iron stove requires the use of a minimum of draft. First build a hot fire in the stove, to get a good bed of red-hot coals. Then fill the stove with pieces of logs as large as it will hold, give it a small draft, and the fire will burn for a long time.—Claude P. Fordyce, Falls City, Nebr.

Method of Saving Gas-Tank Gasket on Late-Model Ford Autos

The late-model Ford gasoline-tank caps are supplied with a loose cork gasket sealing the joint between the cap and the tank, to prevent loss of gasoline. The gasket is easily broken or lost, and at most service stations both cap and gasket would have to be purchased as the latter is not sold separately. The loose gasket should be cemented to the cap with shellac and the exposed side should be dusted with graphite or tire mica to give a smooth surface and avoid tearing it.—E. T. Gunderson, Humboldt, Iowa.



Homemade Drill Press, That Costs No More than About $1.50, Will Be Found Useful in Any Small Workshop

Small Drill Press for Home Workshop

An ordinary small hand drill can be used to make the drill press shown in the drawing. It cost $1.35 and all the other material did not exceed 20 cents. The standard, to which attachments are screwed for holding the drill, is made of 1-in. wood, and the base, which is provided with a clamp so that it can be fastened to the edge of the workbench, is made of the same material. The sliding member and the screw, which raises and lowers the drill, can be clearly seen in the illustration, as well as the other constructional details. Two window-shade supports are fastened to the standard to hold the bit container. The drill press is especially handy because of its small size. When through using it, one can remove it from the workbench and hang it on the wall where it is out of the way.—L. H. Hutchison, Dallas, Tex.

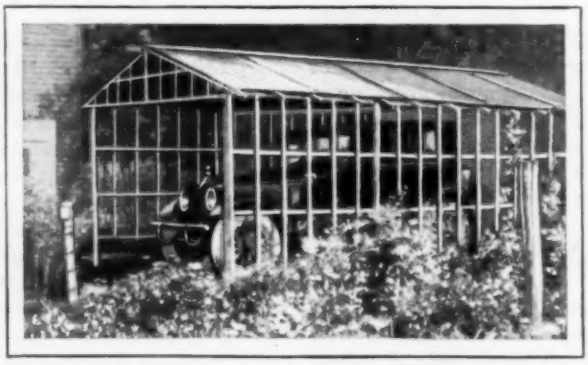
Cleaning Weeds from Brick Walks

Any home owner who has had the good fortune to possess an artistic brick walk, knows well what it means to try to kill off the weeds which will grow between the bricks after the walk is a few years old. To try to pull them seems only to increase their growth.

A better and more practical method is to sprinkle a little powdered bluestone in the joints between the bricks. When it rains, this substance will kill all weed growth for some time and in many cases they will not appear until another season, when seeds are carried by the wind from distant places. Keep the bluestone away from the edges of the walks, or it will kill the grass.

Summer Garage

In our small lot, where space was rather limited, we wanted to have a grape arbor and rose trellis, and also a place to store the car overnight. There was not enough space for both, so we combined the two by putting a roof on a grape trellis, as shown in the photo. Both ends of the structure were left open to allow the car to be driven in and out easily. In this way we made a garage, which was entirely satisfactory during the summer.—H. N. Drio, Edinboro, Pa.



Grape Arbor, Rose Trellis and Summer Garage Combined Form a Practical and Pleasing Addition to the Back Yard

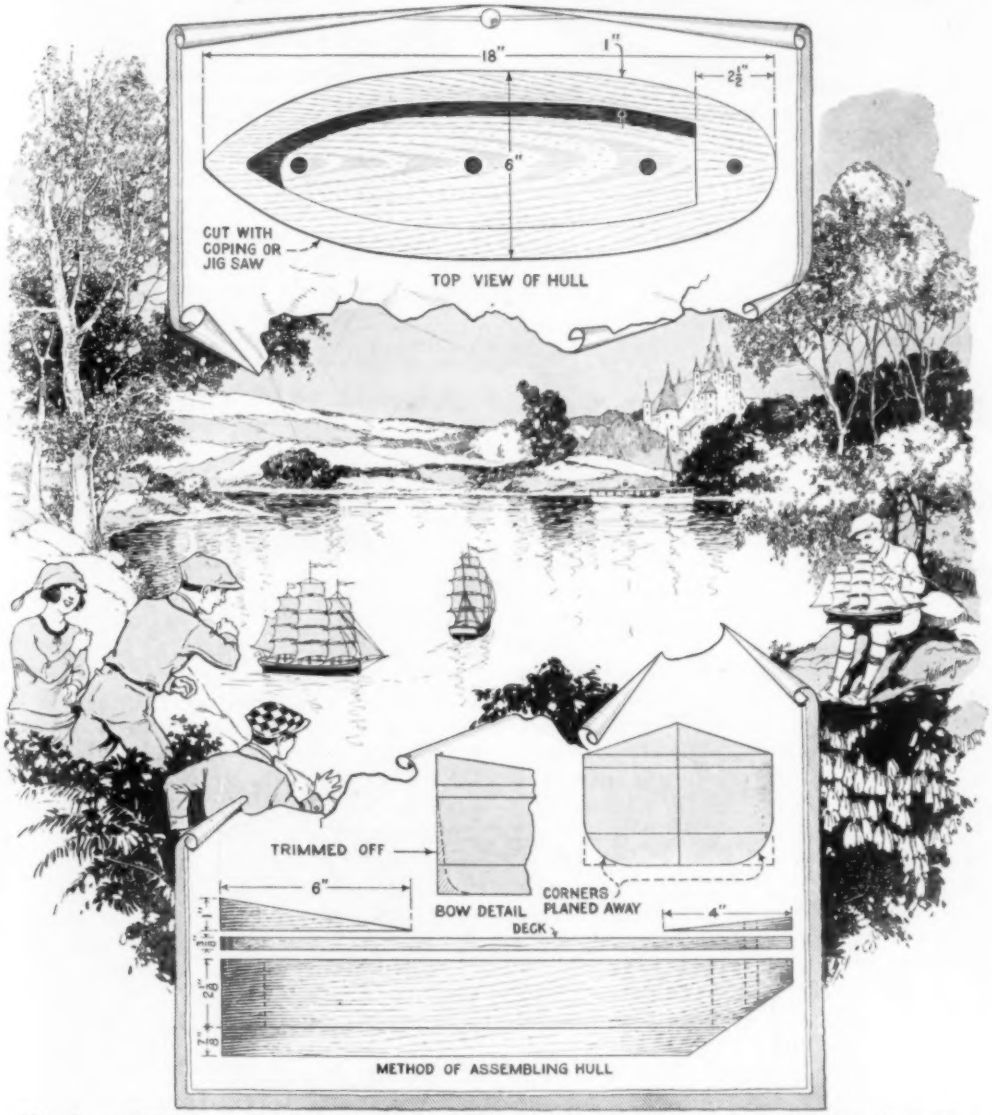
A Square-Rigger for the Boy

By HI SIBLEY

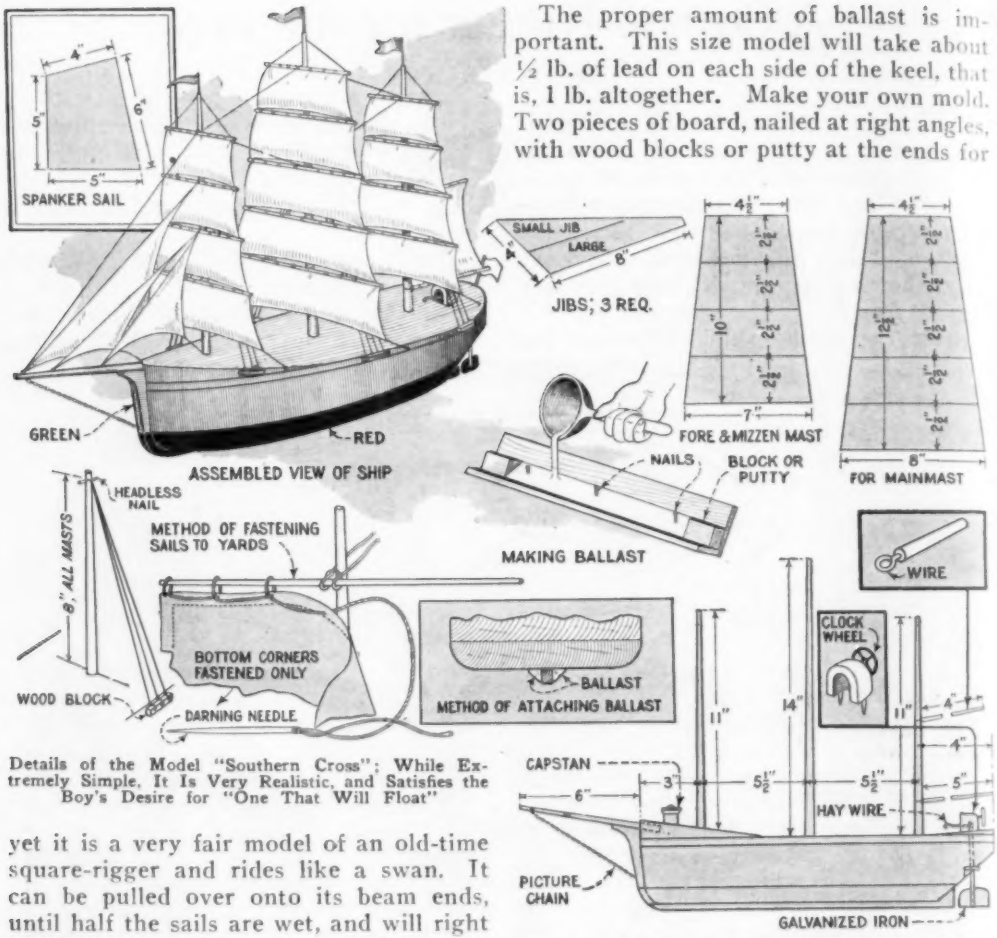
THE vogue for model craft which has launched ten thousand ships has left the youngsters somewhat unenthusiastic, for the reason that these picturesque little masterpieces cannot be tried out in the bathtub. "Gee, that's keen!" they say when shown a new model, and then ask, "Will it float?"

After the model shipbuilder has patiently worked for weeks on the intricate rigging and delicate trim of the "Santa Maria" or the "Half Moon," he is ready to go to the other extreme and make a simple ship.

The "Southern Cross," here illustrated, combines extreme simplicity with great seaworthiness. There is not a single unnecessary item in its entire construction,



Here Is an Easily Made Model of a Square-Rigger That Will Really Sail, and That Will Provide Endless Amusement for Any Boy



Details of the Model "Southern Cross"; While Extremely Simple, It Is Very Realistic, and Satisfies the Boy's Desire for "One That Will Float"

yet it is a very fair model of an old-time square-rigger and rides like a swan. It can be pulled over onto its beam ends, until half the sails are wet, and will right itself at once. Old salts may be somewhat amused at its queer rigging, but it must be borne in mind that the "Southern Cross" was designed for easy construction and sturdiness to stand rough usage in the hands of a hard-riding young skipper.

The hull is roughed out with a coping saw, which also is used to cut away the inside of the central block. Attach the bottom piece and deck to the central block, using glue and nails. Then round off bottom corners and stern overhang with a plane, chisel or drawknife. Next put on the wedge-shaped bow and stern pieces to give the deck the proper sheer or curve fore and aft.

The masts are made from ½-in. dowel sticks, tapered with a plane, and the bowsprit from ⅜-in. dowels. Bore holes for these but do not set them until after the keelboard is fitted.

The proper amount of ballast is important. This size model will take about ½ lb. of lead on each side of the keel, that is, 1 lb. altogether. Make your own mold. Two pieces of board, nailed at right angles, with wood blocks or putty at the ends for stops, will do nicely. Set three or four nails upright in the mold in order to make holes in the ballast pieces to fasten them to hull. The wood mold must be absolutely level when pouring from the ladle. When cold, cut the lead into two equal pieces and finish the rough edges with a file. Nail on both sides of keel, just a little back of center, in order to keep the bow higher than the stern.

For the rudder post, use about 5/16-in. dowel, and bore a ⅜-in., or larger, hole to receive it, so that it will still be loose enough when the dampness swells it. An extra item, though not necessary, is the wood cowl over the top of the rudder post, carrying a small clock gear as a dummy steering wheel. This, of course, can be left off entirely.

Yards should be cut from ¼-in. dowel sticks, and tapered to each end with the

plane; each yard should be ½ in. shorter than the one directly below it. Yards, masts, bowsprit and deck should be given a coat of orange shellac.

Paint the hull a bright vermilion below the water line, and green or black above. Give two coats of these colors, ground in japan, then one coat of spar varnish.

The dimensions of the sails given allow for ¼-in. hem all around. When the sails are set and the yards slung to the masts, go over the strings with a coat of shellac to keep them in place.

Novel Method of Growing Strawberries

It would seem impossible to grow 1,500 strawberry plants properly on a plot of ground 12 by 26 ft. in dimensions. A glance at the photo shows how this has been done, however. A number of concrete blocks, 3 ft. long, 2 ft. high and 15 in. wide at the bottom, were cast, the forms being made from old dry-goods boxes. The blocks were made hollow, with a solid base. Muffin tins were attached to the outside to make the holes in the sides. The making and fitting of the forms, which were collapsible, was the most difficult part of the work, especially the inner one. When finished, the blocks were filled with dirt and the strawberry plants inserted, one in each hole. The roots were watered by pushing a broom handle down into the dirt and pouring water or fertilizer into the holes thus made. With this arrangement much more area is obtained for growing the berries, no dirt gets on them, there is no weeding to be done, and it is easy to clip the runners. To prevent birds from visiting the patch, it is an easy matter to cover the block with netting.

Growing 1,500 Strawberry Plants in a Small Backyard, in Hollow Concrete Blocks

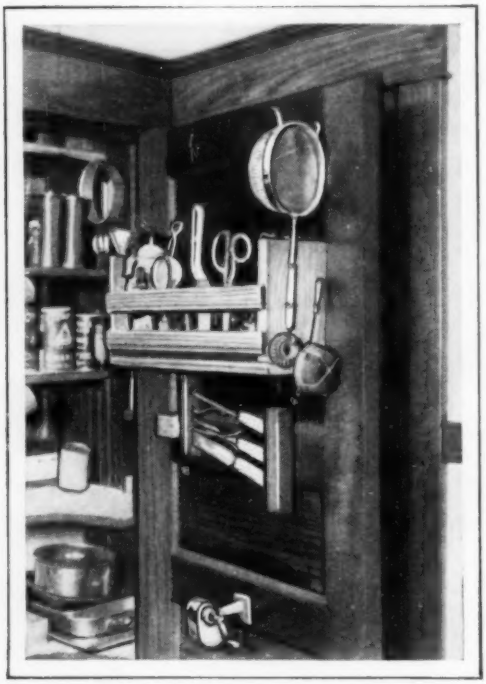
Grinding Juicy Substances with Food Chopper

If an ordinary food chopper is used to grind juicy substances, trouble is often experienced with the juice leaking out at the crank. Screwing the chopper in an inclined position, as indicated, causes all the drainage to take place at the other end. This can be done by providing a triangular strip on the chopper and cutting a nick in the edge of the bench, or by clamping on a board which is inclined. Both alternatives are shown in the illustration.—A. Stenson, Gardena, Calif.

Inclined Food Chopper Prevents Leakage at Handle

Filling the Auto Gas Tank

Many motorists blame gasoline for being poor when the trouble lies in the gasoline hose at the service station. The hose is often hung onto the tank with the nozzle up. Immediately after a rain the water will get into the hose and when the gasoline is poured into the auto tank the water also gets in. Many times the hose is nearly half full of rain water and the motorist is always anxious to get the amount of gas in the hose, not knowing that some of it is water. Therefore it is a good idea, when purchasing gas, to make sure that the water is run out of the hose before putting the gas into the tank.—Charles Latour, Jr., Plattsburg, N. Y.



A Rack on the Inside of the Pantry Door Will Increase Storage Possibilities Considerably

Making More Room in the Pantry

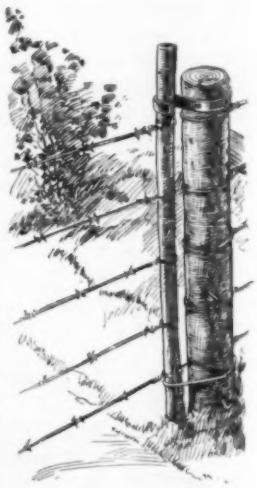
In small apartments or houses where space is limited, the inside of pantry doors and closets offers storage possibilities. The photo shows a homemade rack accommodating about twenty kitchen utensils. It is a three-sided affair, the door itself forming the fourth side. Screweyes are driven into the two ends and front side to hold a number of utensils. Holes are drilled in a wooden strip nailed to the front on the inside, to hold a pair of scissors, pliers and similarly shaped devices. A hole is also drilled in the top of one of the ends to hold a funnel. The front is made of slats so that one can see the storage space behind, which is used for egg beaters, etc., piled in loosely. Just below the main rack a carving set is supported at its ends by two vertical blocks, having holes drilled for this purpose. A third block, with a slit in it, serves as a guard to protect the point of the carving knife. A pencil sharpener is mounted below, where it is within easy reach of the children. The arrangement shown is suggestive only and may be modified.—L. I. Thomas, Oak Park, Ill.

Old Films Start Fires

If you intend camping out this year, be sure to include in your equipment as many old camera films as you think you will need, for although they won't take pictures for you, they will often enable you to get a good dinner in a hurry. You will find them particularly useful for starting a fire on damp and dull days. While a match will splutter and go out, the film is highly inflammable, so after getting the wood all piled to start the fire, stick a piece of film in among the starting twigs and light that instead of the twigs themselves. You will be rewarded with a hot blaze that burns long enough to give the average fire a start. You can easily carry all the films you need in an envelope, and should they get damp, a handkerchief will wipe them off so that a match will light them.—H. A. White, Cedar Rapids, Iowa.

Fastener for Wire Gate

Stretched wire gates, so much used, are greatly improved and made more secure against being opened by the stock by using an S-shaped piece of strap iron, about 1 ft. long, as shown. This enables one to open and close the gate with one hand, which is often handy when carrying something. For a light gate a piece of old buggy tire or similar flat iron will do. Drill two holes near one end to receive nails, which hold it in place on the post, as shown in the illustration.—J. S. Ward, Alamo, Tex.



Salvaging Stained Chamois Skin

Chamois skin that is heavily stained with paint and oil may be salvaged in a very simple manner. Soak the skin in a pail of rain water, to which has been added a gill of strong ammonia, for a period of

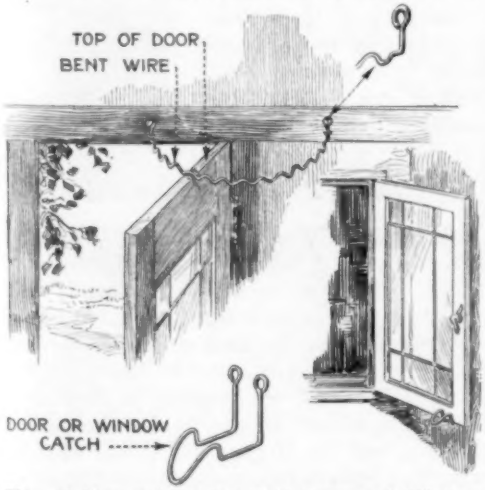
about 12 hours, after which it should be washed out in tepid water (not hot) with pure soap. This puts the skin in better condition than when it is new, for the lint has been removed, and better work can be done with it than before.

Adjusting Carburetor for Altitude Driving

The first thought of the autoist on driving in high mountains is that, on account of the lowered air pressure, he must increase the flow of gas to the carburetor. This, however, will be found to choke the carburetor and slow down the speed. The correct way is to admit less gas to the carburetor to make the gas mixture of the same proportions as at sea level. As the altitude increases above the mile limit you should gradually close down the gas supply to keep the motor running evenly and the carburetor from choking and smoking.

Wire Rack Holds Doors and Windows

To keep doors and hinged windows open and prevent them from being closed by the wind, either of the simple holders shown in the drawing will be found effective. One consists of a length of heavy galvanized-iron wire, bent as indicated and attached to the lintel above the door so that it will hold the door at any point. A window or door catch made of spring wire, such as bicycle or motorcycle wheel spokes, is shown in the lower detail.—V. Hodruss, Port of Spain, Trinidad, B. W. I.



Wire Holders and Catches Hold Doors and Windows Securely against the Wind

Handy Manuscript Holder for Speakers

Many speakers use small notebooks in which to write speeches, but the manuscript holder shown in the drawing has

Handy Manuscript Holder Is Made from Film Spools, Lengths of Wire and Rubber Bands

been found much handier. It consists of a frame, made of two lengths of No. 12 galvanized-iron wire, and two rubber bands arranged to hold two camera film spools. A roll of paper, the same width as the spools, is obtained and the lecture or speech written on it. The ends are cut to a tapered point so that they can readily be inserted in the film holders and the strip of paper is then rolled on one of the spools. It is an easy matter to wind up the strip on the empty spool, and, when finished, a rubber band can be snapped around the spool and the lecture can be filed for future use.—R. M. Thomas, Denver, Colo.

Preventing Putty Marks on Ground Glass

Objectionable marks on ground glass, when glazing a window frame, are made by the oil in putty, and are very difficult to remove. The best and simplest way to prevent them is to rub soap on the edges of the glass before the putty is applied, so that the film will keep all stains from the glass.

Changing Balloon Tires

Anyone who has undertaken to change a balloon tire on the road has found the job troublesome with the use of the ordinary jack furnished with the car. Much of this is due to the difficulty of placing the jack under the axle with the little clearance available when a balloon tire is flat. It is also due to the long lift that is necessary to raise the car high enough to remove the flat tire. The method illustrated overcomes these troubles. The spare tire is first removed from the carrier and placed directly ahead of the flat tire which is to be changed. The car is then driven slowly forward so that the flat tire rides on the spare. In this position, it is easy to place the jack under the axle, and only a little effort is required to raise the wheel so that the flat tire can be removed. The spare is then lifted up and placed into position for service.

Lessening the Usual Difficulty Experienced with a Jack When Changing Balloon Tires

Softener for Paintbrushes

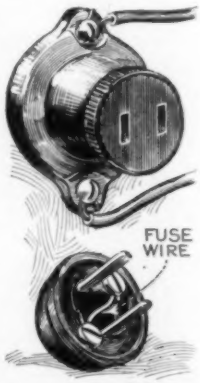
Keeping paintbrushes soft between jobs is one of the bugbears of the home painter. Those that have become rock-hard will probably have to be thrown away, but as long as one shows any pliability, it can be brought back to normal as follows: Mix equal portions of raw linseed oil and gasoline and place in a can deeper than the total length of the brush. Immerse the brush part and put cover on can. In 24 hours, the bristles will be sufficiently softened to allow the gum to be worked out with the hand, whereupon the brush is finally cleaned by washing in pure gasoline.

Preserving Battery Carriers

The band of some battery carriers, under the center of the battery, is usually covered with red, rough rust which is likely to wear into the bottom of the battery case. If the battery is in a metal box, this does not occur, but there are many rubber-cased batteries in use which are not placed in a box, and also many wood-cased batteries. The battery-carrier band should be wrapped with one or two layers of friction tape; this will wear through in time, of course, and also rot if acid reaches it, but will prevent wear on the bottom.

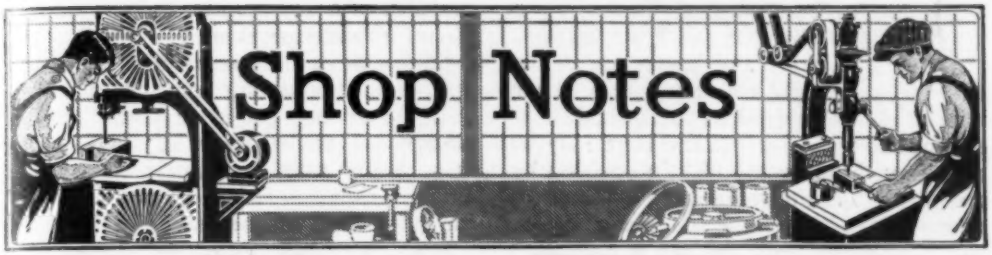
Homemade Renewable Fuse Plug

A renewable fuse plug can be made from a two-piece attachment plug, as shown. Obtain a spool of fuse wire of sufficient strength to take care of the local 110-volt 60-cycle supply, and place a short length across the prong terminals of the plug unit. The screw part of the plug is then turned into the socket and the prong unit pushed in place. If the fuse blows, it is easily renewed.



Cleaning Phonograph Turntables

After considerable use the green-felt covering of a phonograph will become soiled with grease from the hands and from dirt picked up from the records themselves. One of the best cleansers for this is ether. Buy a few cents worth at the drug store and, moistening a clean rag with just a little of the fluid, rub the felt briskly, and the dirt will disappear as if by magic. Ether leaves no stain, the odor soon disappears and the felt looks like new.

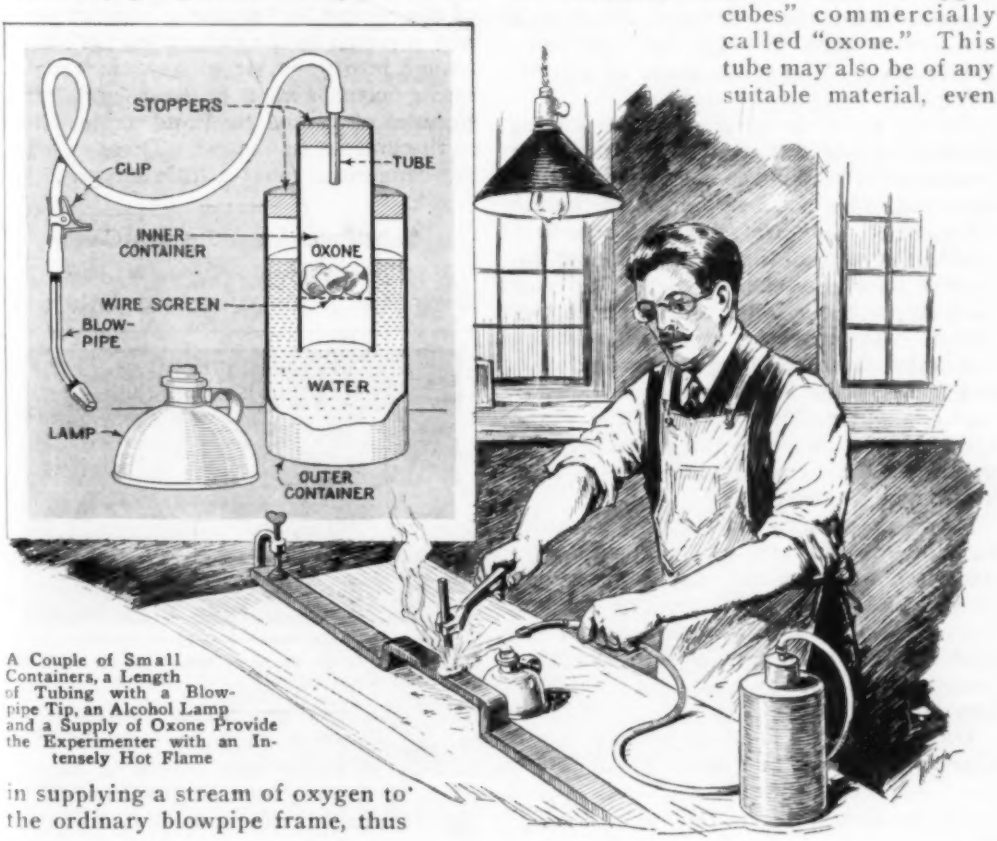


All Shop Notes published in 1926, in book form—Fifty Cents—from our Book Department

A Hot-Flame Blowpipe for the Shop

By H. W. PHILLIPS

IT frequently happens that a very hot flame is needed for a short time in the experimental shop for melting small quantities of metal, welding, etc. In such cases the apparatus described in this article will furnish intense heat at once. It is simple and the expense of making and using it is slight. It is merely the old-time chemical-laboratory gas generator adapted for use in supplying a stream of oxygen to the ordinary blowpipe frame, thus turning it into an oxy-hydrocarbon flame. The outer container may be any sort of vessel that will hold water; a mason jar or a tin can of any sort. Tin friction-top containers are excellent. The top of this is closed with a plug, of wood, cork, or even plaster of paris. This stopper has a hole in the center to admit the inner tube or container, which holds the "oxygen cubes" commercially called "oxone." This tube may also be of any suitable material, even



A Couple of Small Containers, a Length of Tubing with a Blowpipe Tip, an Alcohol Lamp and a Supply of Oxone Provide the Experimenter with an Intensely Hot Flame

paper that has been waterproofed by soaking in paraffin, if nothing else is at hand.

About 1 in. from the lower end of the inner tube is placed a disk cut from screen wire, slightly larger than the inside diameter of the tube, so that the edge may be bent over, holding the disk in position by pressure. This disk keeps the lumps of oxone out of reach of the water in the outer container until the gas is needed.

A piece of metal tubing to run through the plug of the inner container, a length of rubber tubing and a stop clip, such as used on fountain syringes and obtainable in any drug store, and a common, so-called jewelers' blowpipe, costing a few cents, complete the list of material.

If the plugs for the tubes are to be made of plaster, the easiest procedure is to first pour the mixed plaster in a paper box, larger than the diameter of the outer tube. When the plaster has become a little firm, but before it has set hard, grease the edge of the tube, and cut the plug as you would a biscuit. Then shake the plug out, and cut another for the inner tube. Next, push the center tube through the inner-container plug. The plugs must fit snugly, but yet be easily removable.

In operation, the outer container is filled about halfway with water, and the plug replaced. The plug of the inner tube is removed, and some lumps of oxone dropped on the wire screen. Then, first making sure that the spring clip on the rubber tube is closed, so that no air can pass through, the inner tube is put in position. Atmospheric pressure prevents the water from reaching the oxone until the spring clip is opened. When it is opened, water flows up into the inner tube, reaches the oxone and generates oxygen with sufficient pressure to be used as a blowpipe stream.

Any sort of flame may be used; candle, alcohol or plain kerosene. A lamp with flat wick is preferable, the flame being blown the long way of the wick. As you are now dealing with straight oxygen, the heat obtained will surprise you; it is quite comparable to the oxyacetylene or hydrogen flame.

Oxone may be obtained from large chemical dealers, and costs about $1.60 for a 2-lb. can. It keeps very well, if the lid of the can is tightly replaced. I have had a can for five months and the material shows no deterioration.

Oxone is sodium peroxide. The water, after use, is a strong solution of caustic soda, so do not get it on your hands or clothes. I saved some of the solution in a tightly stoppered bottle, as a strong alkaline solution often comes in handy for getting rid of grease.

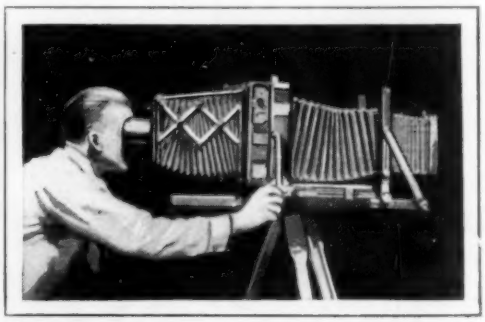
Iron in small form, either cast or wrought, melts easily in the flame. By proper manipulation, and in a closed furnace, small castings can be made. Even platinum (of course in very small quantity) will yield.

All the interesting oxygen experiments can be performed, by using a fruit jar, in the bottom of which is put about ½ in. of sand or ashes, and then pour in a couple of inches of water. Drop a lump of oxone in, and there's your oxygen.

Phosphorus burns in oxygen with a light like the sun. A watch spring or other high-carbon steel will also burn; to demonstrate this, first draw the temper of the spring by heating it, straighten it, wire a match to the end, strike the match, plunge into your jar of oxygen, and the spring burns with a brilliant light, small globules of melted steel and oxide falling to the bottom of the jar. There is nothing dangerous about a little oxygen.

Substitute for Focusing Cloth

Most photographers know how unhandy it is to use a focusing cloth, espe-



Old Bellows Is an Excellent Substitute for Focusing Cloth and Gives Good Results

cially when taking outdoor photos in the wind. By using an extra bellows from a discarded camera and attaching an eyeshade to it, as shown in the illustration, the focusing cloth can be dispensed

with. The small bellows on the front end serves as a lens shade, preventing light from falling on the lens.—Leonard Eilers, Burbank, Calif.

Substitute for Frosted Glass

The breaking of a very large frosted-glass window found us unable to get another in town because of its size. An immediate replacement was imperative, for the glass was a part of the partition of a doctor's private rooms. We finally hit upon an idea that solved the problem easily. A new clear glass was fitted in place and wiped to remove grease and dirt. Then, with a clean brush, the glass was given a coat of white spar varnish on one side. After allowing it to stand half an hour, we applied flour, finely sifted and free from lumps. The flour was dusted on and the surplus wiped off with a light sweeping movement. The result was as good in appearance as the other frosted glasses in the partition. When the varnish had dried, another coat was applied to waterproof it. —H. E. Walker, Herkimer, N. Y.

Conveyor Loads Lumber on Flat Cars

Considerable space and time are saved in a lumber mill by the installation of a double-track overhead-conveyor system, for loading lumber on flat cars, as shown in the photo. While one conveyor is being unloaded on one side of the flat car, the other is loaded, and is then brought in position for unloading while the empty one leaves. Both tracks converge to a single track outside of the loading space.

Western Sawmill Uses Overhead-Conveyor System to Load Flat Cars Quickly

Adjustable Creeper Headrest, Supported on a Coil Spring, Provides Comfort for the Auto Mechanic

Spring Headrest Makes Creeper More Comfortable

When using a rolling creeper for any length of time there is considerable strain on the muscles of the neck and shoulders, as the worker must often raise his head, unsupported, to see how to manipulate the tools. The spring headrest shown in the illustration will be found an effective remedy for this. The center board is fitted with a padded headrest on one end, is hinged in the middle, and a discarded auto-cushion spring is fastened between the headrest and the crosspiece. When reclining upon this creeper, the workman can force the headrest down, or by relaxing, allow it to support his head.

Flexible Shaft for Doing Light Drilling, Grinding and Buffing by Motor Drive

Flexible Shaft for Small Tools

For the home workshop, a flexible shaft for driving small tools electrically from a stationary motor will be found of considerable utility. It consists of a speedometer shaft, a drill chuck and a 1/6-hp. motor. Cut off the square end of a shank and rivet the latter to the endpiece of the speedometer-shaft chain, the lugs on the latter fitting holes that are drilled in the shank. File a slot in the end of the motor shaft, to receive the lug on the fitting at the other end of the chain, and drill a hole through both for a cotter pin. Also drill a hole in the shank of the chuck for a pin to hold the chuck while tools are inserted.—J. Augustus Prendiville, Southboro, Mass.

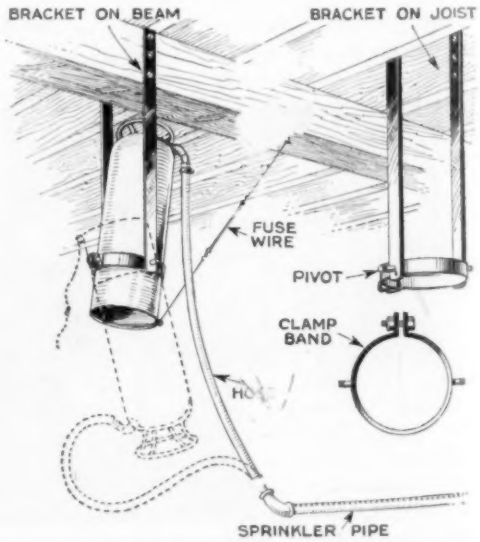
Convenient Opening in a Fence

In places along a fence where a farmer or rancher often goes through, but where he does not wish to place a gate, a simple device may be installed. Buy some round-eye swivel snaps, or use old ones that have been discarded around the barn, one for each wire in the fence. If the opening is made at a wooden post the snap is nailed on with a staple, but if a steel post is in use a wire is used in attaching the snap. In each case the snap should be stationary, and should replace the staple originally used to hold the wire to the post.

When one wishes to pass this place all that is necessary to do is to open the snap, withdraw the wire and hold the wire down while the horse or vehicle passes. It is very easy to snap the wire back, and this saves much time, as otherwise it would be necessary to pull out the staples to loosen the fence.

Fire Extinguisher Operated Automatically

A western manufacturer of electric-motor coils had to keep constant guard against fires in the varnish rooms and arranged extinguishers as shown, which would tip over automatically and sprinkle their contents out through a length of perforated pipe. Each of the extinguishers is supported by two lengths of strap iron, which are screwed or bolted to an overhead beam and drilled through the lower end. A circular strap-iron band is clamped securely around the extinguisher well below the center. Pins, riveted through each side of the band, serve to pivot in the holes drilled in the strap-iron supports. When thus arranged, the extinguisher is top-heavy, but it is held in a nearly vertical position by means of a wire, soldered to the bottom and attached to the beam, as shown. This is cut in half and a length of fusible wire inserted, which, when



Ordinary Fire Extinguisher Tips Over Automatically When Heat Becomes Excessive

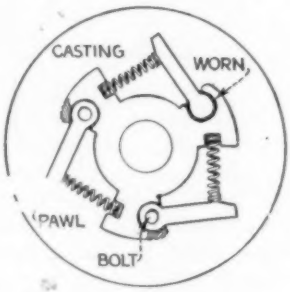
melted, allows the extinguisher to tip over. The rubber hose is connected to a sprinkler pipe running through the drying troughs. Should a fire start, the heat will melt the fusible wire. This releases the overhead extinguisher, which tips over, thus breaking the acid container and creating the pressure to force the contents out of the sprinkler pipes and quench the fire at the start.

Placing Brush Cover Bands

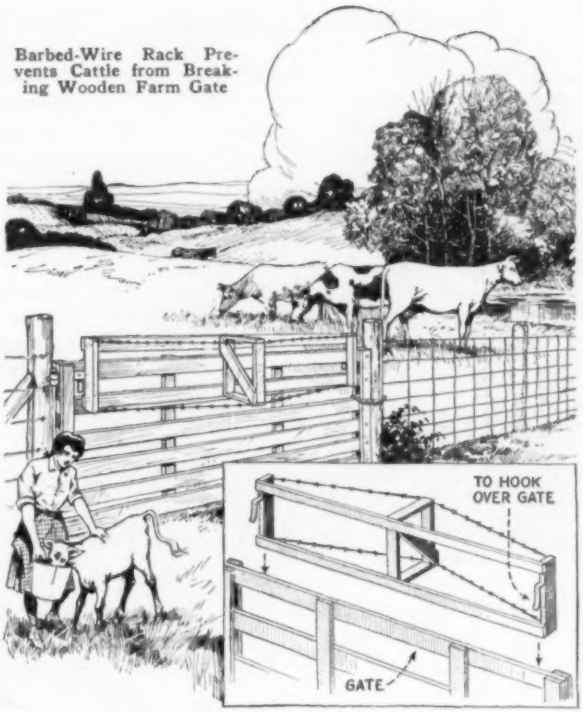
The brush cover bands on Ford starters and generators are clamped in place by a screw drawing the two ears together, one on each end of the cover band. There is a ½-in. gap between the ends of the band when clamped in place. If this gap happens to be placed over one of the openings in the generator or starter yoke, dust and dirt will be admitted. Therefore, the cover band must be placed with the gap over the metal of the yoke, and between the openings giving access to the commutator. The first models of the Ford starting system have a solid cover band, which cannot be placed wrongly.—E. T. Gunderson, Jr., Humboldt, Iowa.

Repairing Lawn Mower

To repair a pawl housing in the wheel of a lawn mower, I drilled a ⅜-in. hole in the pawl and a [illegible] hole in the casting, threaded the latter hole with a ⅜-in. tap and then screwed in a ⅜-in. bolt from the inside so that the pawl pivoted on the bolt. Two nuts are used instead of one to lock them on the bolt without binding against the casting. The writer used a mower with four of the six pawls fitted in this way for a whole season.—Oscar Boding, Crosby, N. Dak.



Barbed-Wire Rack Prevents Cattle from Breaking Wooden Farm Gate



Farm-Gate Protector Prevents Cattle from Breaking It

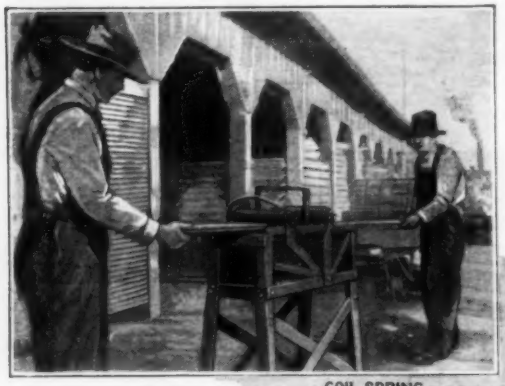
Wooden gates used between fields are likely to be broken down by cattle trying to reach over them to get at fodder in the next field. This trouble can be prevented by hooking a barbed-wire protector over the gate, as shown in the illustration. It consists of a wooden frame, with the wire applied as indicated in the lower detail, and two pieces of flat iron bent to form hooks, which are slipped over the gate. It is placed on the gate so that the barbed-wire section is on the side where the cattle are, and will effectively prevent them from reaching over. In the drawing, however, the protector is set on the wrong side to make the arrangement plainly visible.

Removing Scratches from Plate Glass

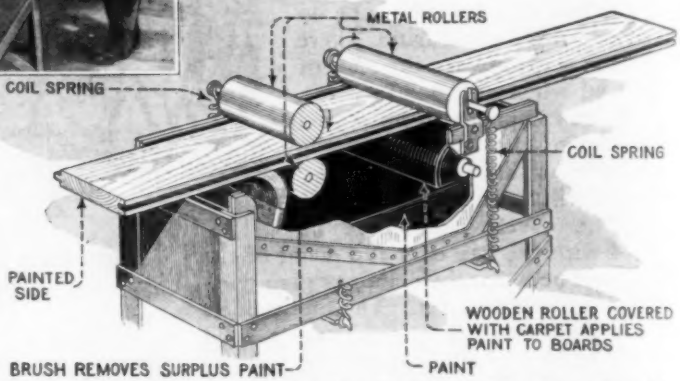
Scratches in plate glass can be polished out easily in the following manner: Mix powdered chalk, 60 parts; tripoli, 30 parts, and bole, 15 parts, to a fine powder. Dip a wet, soft cloth in the above preparation, and rub the scratched spot until it has disappeared. The method is, of course, not applicable to very deep scratches.

Device Paints Boards Quickly

At a western woodworking plant it was necessary to prime a large quantity of pine siding. In order to do this as quickly as possible, the painting device shown in



the photo was made. It enabled two men to paint 1,000 pieces of 6-in. siding, 8 ft. long, in five hours. A sheet-metal trough, about 3 ft. long, 1 ft. wide and 1 ft. deep, is mounted on strong metal legs and two sets of rollers, between which the boards are passed, are arranged in and above it, as indicated. Three of the rollers are of metal, while the fourth is wood with a covering of carpet tacked on. This rolls in the paint and applies it to the underside of the board as it is pushed through. A large brush near the other end, also on the underside of the board and inside of the trough, removes surplus paint and assures a neat, smooth job. Besides the timesaving feature, all waste of paint is avoided by using this device.—Jos. C. Coyle, Denver, Colo.



Machine Used by Western Woodworking Plant for Painting Large Quantities of Siding; It Does the Work Quickly and Wastes No Paint

How to Protect Your Trees against Mice and Rabbits

Here is a kink that costs nothing and is worth many dollars to orchard men. Go to a railway siding where cedar ties have been peeled, gather up a quantity of the bark and cut it into 18-in. lengths. Drive strips of bark into the soil around the tree trunks and tie a cord around their tops. As the bark is light, a large quantity can easily be carried in a bushel basket. It will be partly curled by the sun, if the ties or poles have been peeled sometime previously, and this curvature will make it fit the tree trunks. I have tried tar paper, wire screen, etc., for the same purpose, but this suits me best and costs the least. Leave the bark in place summer and winter. Bugs will not hibernate in it. The growth of the tree will stretch the twine for two or three years until it breaks. The bark, if it is stuck well into the soil, will still stand as long as the tree needs it—five or six years, until the danger from mice and rabbits is past. If I were located where cedar bark was not available, I would use cedar stakes, split from old telephone poles, railroad ties or fence posts, in the same way. Cedar shingles would also answer the purpose, set with the thick end down.—J. H. Denison, Bayfield, Wis.

Crude Oil as Wood Stain

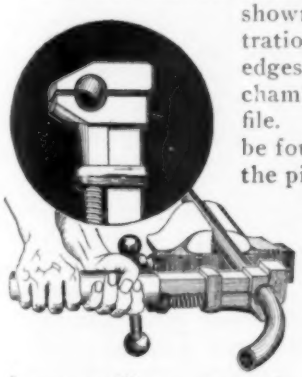
A wood stain with many practical uses in the laboratory or workshop can be made from crude petroleum. Mixtures of it with gasoline in varying proportions will give stains for the softer woods in good imitation of practically anything from light, golden oak to a dark walnut. Oils from different districts have different characteristics, and the right proportions will have to be found by experiment. The gasoline evaporates quickly and leaves the

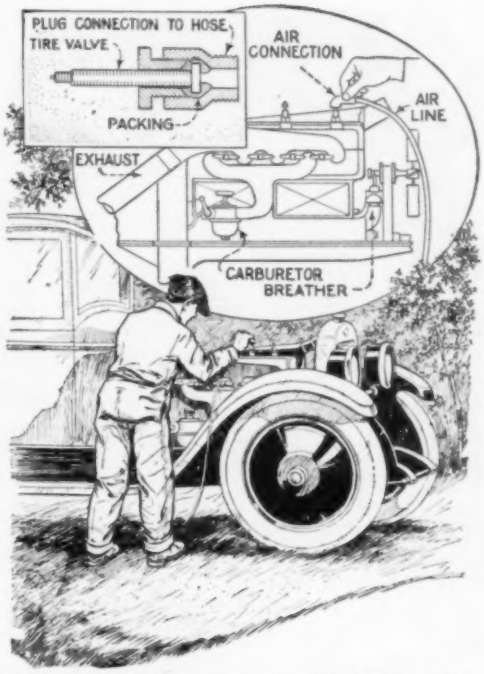
wood with a dull finish. Polished effects can be obtained with the usual methods for other stains, but a cheap and durable polish is realized by applying hot beeswax with a brush and rubbing off the excess with a soft muslin cloth. Such stains are useful for shop or other furniture that is subject to hard usage, as they are cheap, have high penetration, keep the woodwork neat, and act as a preservative.

For laboratory tables or storage-battery workbenches, where an acid and waterproof coating is desired, the following can be used: Apply a generous coat of boiling-hot unmixed crude oil with a brush. If the wood is well seasoned and porous, apply a second coat. A finishing coat of a hot half-and-half mixture of crude oil and beeswax should be applied, and the excess oil and wax rubbed off with rags or waste. A blowtorch or Bunsen flame played over the surface of the wood to keep it hot will assist this rubbing operation. The resistance of this coating even to hot concentrated acids as encountered in chemical analyses is surprising. Care must be taken, however, as hot crude oil is inflammable and therefore large quantities should not be heated over a flame.

Wrench for Bending Small Pipe

When no pipe-bending table or wheel is available, the work can be done by means of an ordinary large-size monkey wrench, with a hole drilled through the jaws as shown in the illustration. The outer edges of the hole are chamfered off with a file. Usually it will be found best to hold the pipe in a vise, but sometimes the handle of the wrench may be gripped in it to better advantage. Bends of different radii are made by regulating the distance between the jaws of the vise and the wrench. A 1-in. hole will accommodate pipe up to ¾-in. iron size, the largest to which this method can practically be applied.—O. S. Sprout, Lancaster, Pa.





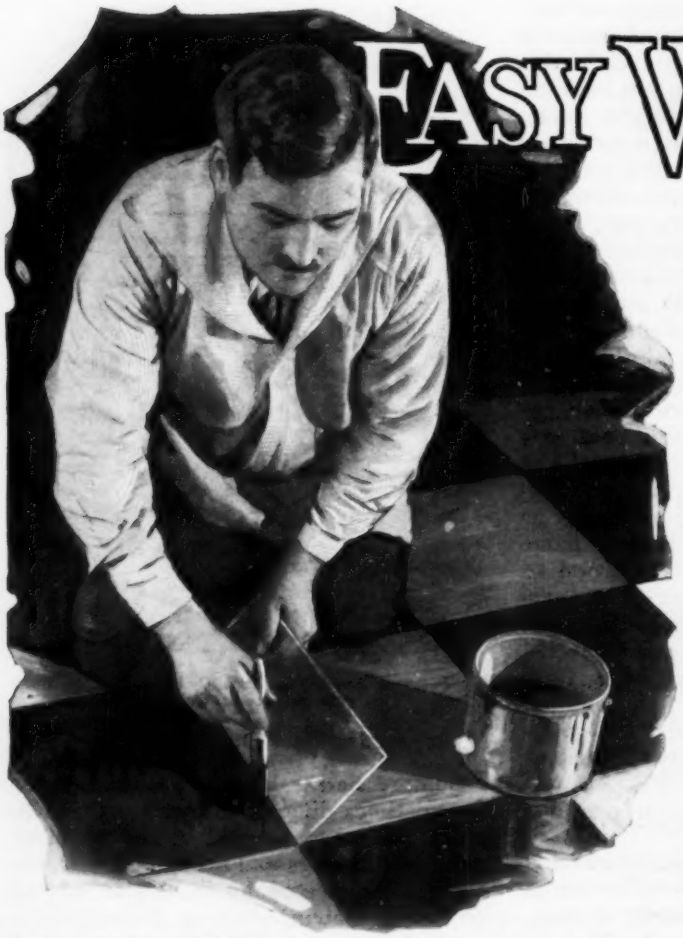
Air Pressure Applied to Auto Cylinder Locates Compression Losses Quickly

Compression Loss Detected by Air Test

Compression leakage in an auto engine is sometimes difficult to locate. Contributory causes, as warped valves, worn or stuck piston rings and broken gaskets, are not easily detected by inspection of the parts. The drawing shows a method of determining accurately the loss of compression in a cylinder, by means of a special plug made from the shell of a spark plug and a valve stem from an inner tube. The piston is placed at the bottom of the compression stroke, air pressure is applied and the mechanic listens for the hiss of leaking air. If this is audible at the breather pipe, the piston rings are at fault; if it occurs through the carburetor, the intake valve is leaking, and if it can be heard through the muffler, the exhaust valve is the offending member.—G. A. Luers, Washington, D. C.

¶A type cleaner for typewriters which has proved entirely satisfactory consists of carbon tetrachloride, 95 parts, and ammonia, 5 parts; it is applied with a brush, and the type should be rubbed with it until it is clean.

EASY WAYS to



Applying the Stain for the "Parquet" Floor; Note How the Glass Is Held So the Stain Will Not "Blot"

TO possess a Castle in Spain may seem a very unattainable dream; but when the plain, drab four-square walls of any room may be made to reflect the variety, dignity and charm of an old-world interior by a small expenditure and effort on your part, you lend substance to the stuff of your dreams.

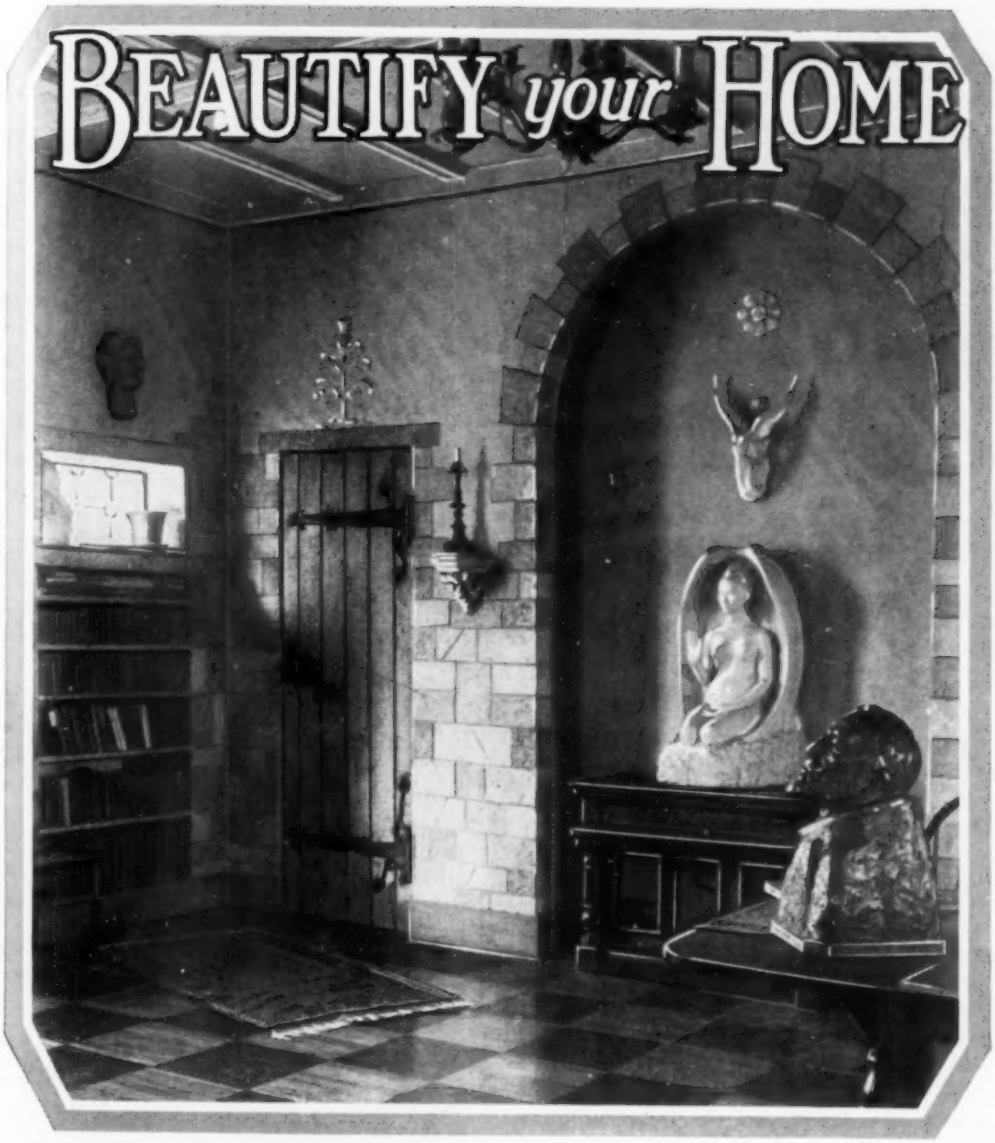
The buildings of Europe seem to have grown out of the ages. They have that livable feeling which is the real mark of a home. This charm is produced by the successful combination of a great variety of building materials. There is the picturesque strength of stone masonry, the intricate designs of wrought-iron hinges and lock plates, the mellow rough texture of aged woods, the infinite variety of rough plastered walls, the parqueted, or perhaps, stone, floor and a dash of colorful design on the ceiling beams, which lends life to the whole.

When Oskar J. W. Hansen, a sculptor, wanted to convert an old barn into a studio of real distinction, he found a simple way by which the costly method of European construction could be reproduced. The accompanying pictures show the results obtained, and the method is amazingly simple. All it requires is a careful attention to the details described.

The first thing is the "stone" work: After you have removed the old wallpaper or calcimine from the walls and ceiling they are ready for the work to begin. As you will see from the photograph the stone work can be varied in height and design to fit around the doors and windows. The rest of the walls and ceiling should be in a fairly simple rough plaster texture. This gives a solid feeling of balance to the room and at the same time provides a wall of interesting variety.

The plaster material used as a foundation for this stone mixture is called marbl-cote B. To a gallon of boiling water add enough of this powder to make a mixture the consistency of cream. Then mix in, slowly, enough plaster of paris to make a thick paste. Stir this paste until it is free from lumps, and it is then ready to be applied to the wall. This should be done at once, while it is still soft and warm.

With a pencil, draw a rough outline on the wall to show the height and shape of your stone work, and then with a small square plasterers' trowel spread on the

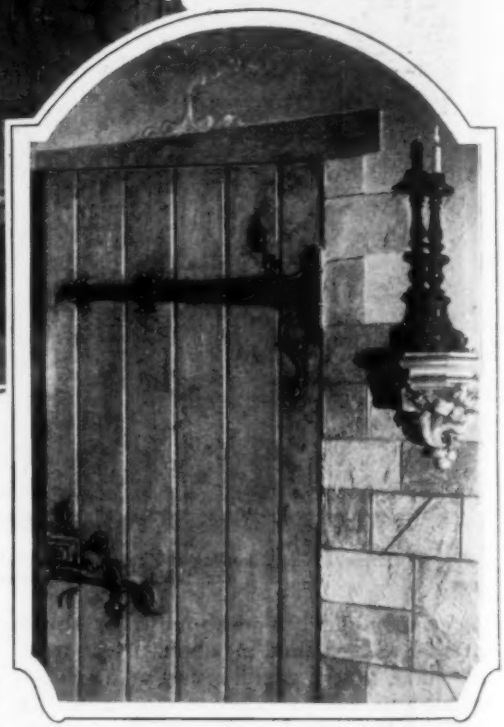


View of Corner Studio, Showing the Effect of the Floor, the "Stone Work," the Rough Door Texture and the "Wrought-Iron" Hinges and Latch on the Door

paste fairly evenly and about ¼ in. thick. After it has hardened for about fifteen minutes, take a stiff small brush or a whisk-broom and, with a sidewise motion of the hand, make scratches all over the surface of the plaster. Ever so often, pound the brush in straight and then pull it away. Some of the material will follow the brush and leave rough holes and marks on the wall. In this way you can produce any kind of stone effect you wish. The softer the paste, the rougher the texture. For a sandstone effect, let the mix get quite hard on the wall before brushing.

The next step is to mark off the joints between the stones. It is better to make the stones of varying sizes and shapes, and this is done by simply dragging a small modeling tool along a straight guiding stick. A modeling tool for this purpose can be made out of a round stick, 6 in. long and ¼ in. thick. Make one end

While the walls are drying, you can get on in your work by making the imitation wrought-iron hardware. Leave your old hardware on and model over it. The mixture for this work is the same as for the walls except that you put in more marb-l-cote and but a small quantity of plaster of paris. This will give you a mixture which will withstand the constant vibrations of opening and shutting the doors. The mixture should also be made a little stiffer than for the walls. For the design of your hinges, you may either use those



Another Door, with Simpler Hinges and Ornamental Frieze on the Lintel; Below, Close-Up of Door

flat and pointed and the other end oval and rounded. With this tool you can model anything you wish. While the plaster is still soft, you may even want to model into the center of some of the stones some simple design of a flower or a rosette. When the plaster gets dry, these designs look like stone carvings. In the same manner you may model an ornamental lintel for the top of door openings or an ornamental shelf for the fireplace. You do not need to do all this in one day, as the material joins easily to itself. When all the stone work is done, let it dry for at least two days. Then do the coloring.

of the accompanying illustration, design some yourself, or consult illustrated books on ancient buildings at the public libraries. You will find a wealth of designs to choose from. First draw the designs on tracing paper and then transfer them to the doors.

View Showing How the Stone-Work Design Is Carried around Window Openings in Irregular Yet Unified and Highly Artistic Style

If the door is heavily varnished, the surface should be scratched with a coarse sandpaper so as to give a "tooth" for the plaster. After transferring the design onto the door, drive a few small large-headed nails into the wood and let the heads stick out about ¼ in. Now spread the warm plaster mixture onto your design, to the thickness you want your hinge, and let it set for a while. When it begins to get hard, fasten your tracing paper over the plaster and cut through to the wood with a small penknife. In this way you will get a sharp outline of your work. Then you can imitate hammered-iron effects by using the rounded end of your modeling tool and squeezing dents into the plaster, and with some softer material put in the rough "nail heads" in their appropriate places. Do not do this work of modeling too carefully; leave it a little rough and crude—it looks more genuine that way. The hinges should now dry for at least two days. During this time you may antique the woodwork and rough-coat the upper walls and ceiling.

The mixture for the woodwork is the same as for the hardware except that you add enough water to make it very thin—thinner than for the walls—and apply it to the wood with a medium-sized paintbrush. By stippling it on the wood you will get a nice rough texture of even roughness which you may vary with a twist or turn of the brush now and then to suit your fancy. The same thing can be done with the upper walls and the ceiling. They can be made a little rougher than the walls but not too much so; it is better to keep them fairly plain so as to make a contrast with the stone. The whole room is now allowed to dry and then you can proceed with the coloring.

To color the stone work, apply first one coat of a light cream-colored flat enamel. When this is dry, make a thin mixture of turpentine, burnt umber in oil, and add just a little raw sienna and lemon-yellow.

A Glimpse of the Plasterboard Ceiling Beams; the Windows Here Formerly Lighted the Horse Stalls in the Barn

Put the colors into the turpentine very slowly and a small quantity at a time. Stir until they are thoroughly dissolved. Try on a small sample until you have the correct shade. Now begin to color each stone in the wall by itself. Rub into the texture a quantity of the color mixture with a small paintbrush and, while it is still wet, rub off enough with a soft rag to leave the stone of the desired color. In this way you can vary the tones of the individual stones according to how much color you allow to remain. It is also a good idea to save some of the cream-colored enamel and from time to time stick your brush into it and then into the umber mixture. In this way you will give some of the stones a sort of warm gray, dusty finish that is very agreeable.

For the woodwork of a Spanish or Italian interior, pistachio green makes a very pleasing color contrast. Pistachio green is made by painting your woodwork with two coats of flat enamel colored a light blue. Cobalt blue into white makes the right color. When this is dry, brush on the same kind of color mixture that you used for the finish of the stones and wipe off with a soft cloth. The umber mixture will turn the blue into a soft mysterious shade of green, and the slight roughness produced by the marb-l-cote finish retains enough of the darker coloring to give the wood an aged, mellow appearance. This finish grows more beautiful with age.

You can now make the hardware a dark dusty brown by allowing the umber mixture to dry on without wiping. Then, after it is dry, add a few touches of raw sienna to give a rusty effect and a few touches of red to the nail heads for the purpose of color accents.

The upper parts of the walls and ceiling should be done in a soft grayish shade of tan, to harmonize with the stone work. They can be given added interest by making a thin mixture of orange and then dipping the points of a sponge into the color and touching the sponge very lightly to the wall. A faint touch of color like that gives the wall a deep vibrant feeling, while at the same time it is apparently very plain and severe. If the ceiling has beams, they can be stenciled in some quaint old pattern, but it is equally satisfactory to leave them plain.

The room is now all finished except the floor. A very distinguished-looking floor can be made by staining an ordinary oak floor with dark squares. The size of the squares should vary with the size of the room, 12 to 18 in. being the average size. After the floor is finished in the ordinary manner (do not attempt this finish over varnish), the squares are measured off

and marked on the wood in pencil. Care should be taken to have them come out as even as possible on all sides of the room. For the light squares the wood is left in the natural color, while every other square is stained dark in checkerboard fashion. The effect is a floor almost equal to the finest parquet. The handling of the penetrating stain so as to get sharp lines without blotting into the light squares requires careful attention to the method used. A piece of glass, a few inches longer than the square, and a new 1½-in. rubber-set flat brush are used to apply the stain. The glass is held at an angle of 45°, as shown in the illustration. The brush is dipped in the stain and wiped almost dry in the center of the square to be stained; then, with a steady motion of the hand, a line is made along the glass on each of the four sides of the square. The secret is to keep the brush almost dry. The center of the square is then carefully brushed in.

The cost of such a floor is just about one-tenth of a real parquet floor, and the appearance is about the same. After the stain is dry the floor is either varnished or waxed the same as any ordinary floor. A few small Oriental rugs will complete the picture. The room will look spacious and elegant and will always seem inviting for dances and entertainments. With the fine reproductions of period furniture which are now so cheaply and easily obtained, you can carry out the rest of the ensemble and become the proud possessor of an honest-to-goodness Castle in Spain.

Remedy for Slipping Tractor Belt

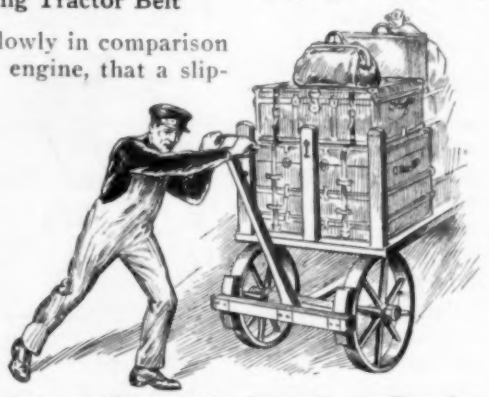
Tractors travel so slowly in comparison with the speed of the engine, that a slipping fan belt will invariably cause an overheated engine. To prevent slipping, wrap several turns of tape around the center of the fan pulley and the pulley on the engine crankshaft. This provides friction and causes the belt to ride in the center.

Coin or Washer Stacker

A useful tool for stacking piles of similar coins or washers can be made of sheet metal, bent as shown in the drawing. The stacker is pulled through a pile of coins or washers and will pile up several at each pull. By pushing the tool backward, the pile thus collected will be left standing by itself. To stack without counting the pieces, the pile picked up at each movement can be left as it is. If it is desired to count as well as stack, the tool should be made the proper height to hold a certain number of pieces. If the stacker is not filled by pulling it through the pile, a few extra coins or washers can be quickly added with the fingers.

Brakes Make Hand Trucks Safe to Handle

A large eastern railroad has applied a pair of brake shoes to all of its platform baggage trucks to prevent them from being moved when the handle is raised and hooked. The brake shoes are a pair of wooden blocks bolted to the cross-piece on the handle. Besides preventing movement of the truck when it is not in use, the brakes also will control the movement of a truck under a heavy load on an inclined surface.



Brakes on Railway-Station Trucks Prevent Them from Moving When Not in Use

Simple Tool Made of ½-In. Wire Mesh, to Give Rough Finish to Plaster

Stipple Trowel for Rough-Surfacing Walls

During the construction of a new house I watched the interior finishers give the plaster a rough finish. The tool used for this purpose was made by folding over a piece of wire mesh and attaching it to a wooden handle. By twisting, patting or stroking the tool over the plaster attractive finishes were produced. The tool was of the very simplest construction. It was found that ½-in. wire mesh, 6 in. wide and 24 in. long, was best suited to the purpose. The ends were tapered to fit the handle, and then the strip of wire was doubled over lengthwise so that the ends could be tacked to the handle, as shown in the illustration and details.—L. B. Robbins, Harwich, Mass.

Painting over Keene's Cement

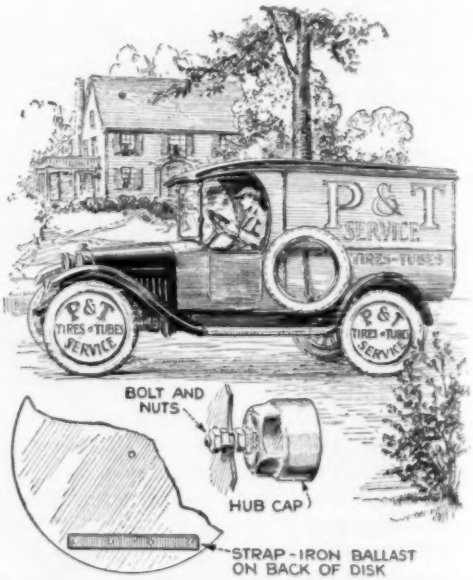
To paint or enamel over Keene's cement successfully, the painting must be done at the latest within 24 hours after the plasterers have finished their work. The reason for this is that this cement is very sensitive to moisture and, though apparently dry, will absorb all of it present in the atmosphere. When the cement has absorbed moisture, it is impossible to keep the paint from running when it is applied. This is quite enough to prevent any chance of doing a perfect job.

Effect of Temperature on Steel Tapes

The United States temperature standard for steel measuring tapes is 68° F. The standard tension for a steel tape, 50 ft. long, supported throughout on a horizontal flat surface, is 10 lb. The coefficient of expansion of steel tapes, as determined by the bureau of standards, is .00000645 in. per degree Fahrenheit. This means that steel tapes change by that fraction of their length for each degree rise or fall in temperature. This figures out, for a 50-ft. tape, to an increase in length of .00387 in. for 1° rise in temperature, and the tape is shorter by the same amount for 1° drop.

Wheel Sign for Delivery Cars

The wheel disk shown in the drawing does not revolve with the wheel, but stands still, and the wheels appear as if they were sliding along. The disk is made of medium-gauge tin, and is cut the size of the wheel without the tire. A ⅛-in. hole is drilled in the end of the hub cap, a 1-in. stove bolt is inserted through the hole from the inside, a nut is screwed on it at the outside, and the disk is then put in place. Two nuts are screwed onto the end of the bolt to secure the disk. The first nut is not screwed up tight and the second nut locks the first. A piece of strap iron



Signs on Automobile Wheels Remain Stationary While the Wheels Rotate

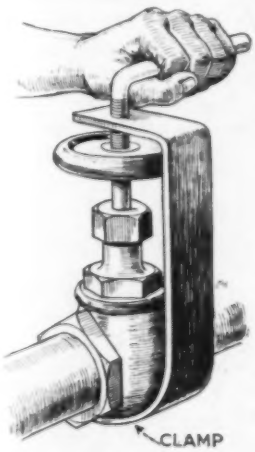
is riveted to the lower side of the disk, on the inside, and acts as a ballast to keep the disk from turning with the wheel. This makes an attractive sign, which can be read whether the car is moving or standing still.—Thos. F. Johnson, Cuero, Tex.

Sand Blast Removes Paint from Wicker Furniture

When it is necessary to repaint reed or cane furniture, it is nearly impossible to remove the old paint. An Indiana bus company experiencing this trouble, solved the problem by means of sand blasting. The sand was applied at a 45-lb. pressure, to prevent cutting the reeds, and care was taken not to keep the blast on one spot too long. The same method was used to remove paint from canvas roofs.

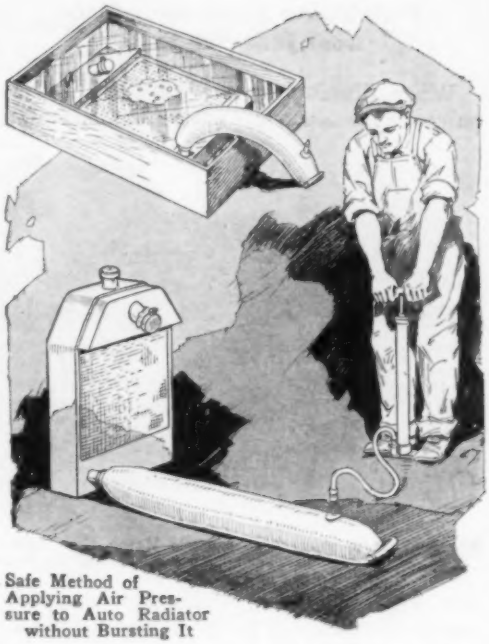
Emergency Repair for Stripped Valve-Stem Thread

Due to excess pressure and hard usage, a steam-valve connection in a small paper-making plant was stripped, resulting in continued escape of steam. It was impossible to cut out the line, and to make a quick emergency repair, the method shown in the illustration was used. A rough clamp was formed from a piece of heavy flat iron to fit the valve, and a hole was drilled and tapped through it for a threaded screw, which was made from an iron rod and bent. Obviously the same repair is applicable to screw-down faucets or valves in water lines.



Air-Pressure Test on Radiators

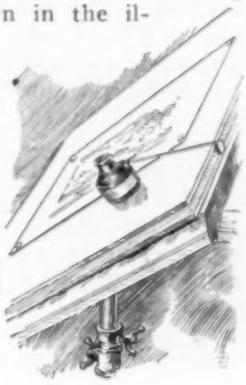
A good method of testing a repaired radiator consists in immersing it in a vat of water and then pumping air into it. An ordinary tire pump is attached to a special filler cap, which screws onto the filling opening. To eliminate the danger of damaging the radiator by too high pressure, one repair shop has adopted the safety measure shown in the illustration. An inner tube is used as a reservoir for the air and also acts as a gauge to show the amount of pressure. The top opening or inlet is closed with a rubber gasket, the overflow pipe is corked, a gasket is used in the filler-pipe cap and the tube reservoir is connected to the bottom radiator outlet, as indicated. In this way the radiator is fully protected.



Safe Method of Applying Air Pressure to Auto Radiator without Bursting It

Holding Ink Bottle on Drawing Board

About the simplest way in which the ink bottle can be held on a tilted drawing board is that shown in the illustration. One end of a string is tied around the neck of the bottle and the other end is fastened to the upper edge of the board with a thumbtack. The bottle will not slip even though the board is set at a steep angle.



Portable Air Compressor Made from Junk-Pile Parts

When digging up asphalt road for repairs on the street-car tracks, it was found that, although the air drills were not very costly, the price of an air compressor exceeded the sum available. The road-maintenance mechanic studied the problem for a time and then went to the junk pile, where he found a discarded street-car truck and enough other parts to make a compressor. The motor is electrically driven, connection being made with the trolley wire by means of a hooked conductor. The air pump is controlled by means of an automatic switch, which stops the pump motor when the air in the tanks reaches the maximum pressure. Lengths of regulation-size air hose lead to the drills, which have interchangeable bits for either breaking up the roadbed or tamping up cross ties. The compressor was mounted on an old auto chassis so that it could easily be towed from place to place. The designer claims that the device cost much less than the manufactured air compressors. The ground connection for the machine is made from a short length of flexible conductor clamped to an old-fashioned smoothing iron. This is set, face down, on the track rail. It can be seen in the photo under the truck on the ground. The conductor pole is along the top and the drills rest on the side.

Air Compressor Made from Electric Motor, Compressor, Tank and Automatic Switch Taken from a Discarded Street-Car Truck

Sill as Guide for Car Doors

Some of the older Ford closed cars were not fitted with rollers on the door frame nor was there a projection on it to prevent the door from sagging slightly and striking on the sill beneath the door when closing. The hinges on doors of this kind will bend after long use because of the weight. Doors to which this has happened can be improved, after straightening the hinges, by cutting a little wood from under the metal plate on the sill. This is done at the outer edge only and causes the plate to incline downward where the corner of the door would strike it, tending to lift and guide the door when being closed. The wood is removed for about 2 in. at the point where the sill curves upward at the catch side of the door.

Substitute for Draftsman's Quill

When the cork is left out of the drawing-ink bottle, the quill will invariably curl, so that it does not reach the ink and then it is necessary to shake the bottle in order to load the quill. A good remedy against this trouble is to cut off the quill and replace it with a ball-pointed pen, as shown, which will always reach the bottom of the bottle.

Ball-Pointed Pen Eliminates Trouble Experienced from Curled Quills

Keeping Battery Cable in Place

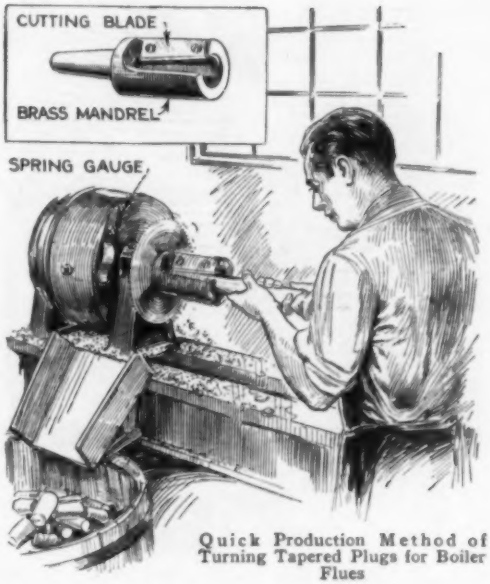
When the battery cable loses its grip on the post and jumps off, trouble may result, due to the intermittent connection as the car vibrates. To overcome this, drill and tap a small hole in the center of the post. Then lay a washer, large enough to cover both post and cable ring, over this hole and fasten it with a machine screw threaded down into the tapped hole. This will prevent the cable from jumping off, but it can be removed by taking out the screw and slipping off the washer.

Gasoline-Pump Extension

In order to comply with the regulations of a small city where the location of gasoline pumps on the curb is prohibited, one garage owner installed the pump next to his garage and provided an extension, as shown in the drawing. A swinging joint was attached to the top of the pump and a suitable length of pipe was fitted to the joint to extend horizontally to a position just above the curb. A guy wire was used to support the pipe so that it

Overhead Extension on Gasoline Pump Where Curb Location Was Prohibited

could be extended over the curb when required and swung against the side of the garage after use. An elbow was fitted at the end of the pipe and the hose was attached as indicated in the drawing.—J. S. Hagans, Chicago, Ill.



Quick Production Method of Turning Tapered Plugs for Boiler Flues

How to Turn Small Wooden Plugs

Making little round wooden plugs for boiler flues was a tedious task when ordinary hand methods were employed, but with the simple device shown in the drawing, they can be turned out very quickly. A small circular saw, on an 8-in. section of brass mandrel, is screwed onto the shaft of the high-speed motor which runs the lathe. A tapering hole, 4 in. long, with a slot in one side, is drilled into the end of the mandrel, and a cutting blade is screwed to the edge of the slot at the same angle as the taper. The device works like a small pencil sharpener. After the plugs are turned, they are pushed against a small spring gauge attached to the side of the motor and severed with the saw. A chute guides the plugs into a barrel.—Jos. C. Coyle, Denver, Colo.

Release for Milk-Can Cover

When putting a cover on a filled milk can, it is often found that it goes down hard and with a tendency to spring up, especially if the can is well filled. This is due to the compressed air under the cover. To remedy this, drill a small hole in the cover, conveniently near the handle, and fit it with a cork. Then remove the cork when putting on the cover and replace it when the air has escaped.

Preventing Plaster from Cracking along Floor Joists near Top of Stairway

To Prevent Plaster from Cracking

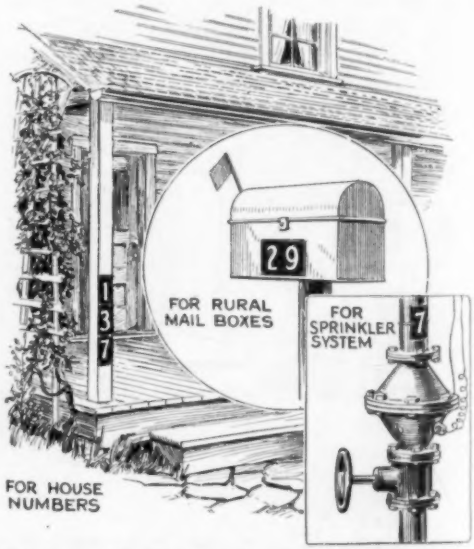
Plaster often cracks where it covers the floor joist that runs along the top of the stairway, because it will not anchor securely on the joist. To prevent this, nail short lengths of lath on the joist vertically and then apply a strip of metal lath. This provides some space for the plaster to work behind the metal lath, and it will never crack. Another weak spot is in corners, especially under stairways. This trouble can also be remedied by applying a strip of metal lath, bent to conform to the corner, as shown in the illustration.—Robert Page Lincoln, Minneapolis, Minn.

Overhead Bracket for Ignition Wiring

Special battery-ignition systems for Ford cars have a bracket held under one of the cylinder-head capscrews, for spark-plug wires. These brackets are rather short, and the wires are held close to the top of the motor, where they are exposed to the heat, and are in the way when spark plugs must be removed. The bracket should be hung from the radiator stay rod, leaving plenty of space for work on the plugs, and holding the wires farther from the heat. A steel strip, 1 in. wide, 1/8 in. thick and of a length depending on the model of the car and the make of the ignition system, and two clamps like those of the gas-feed pipe are used for this purpose. A hole is drilled in one end of the strip and the two feed-pipe clamps are bolted to it and clamped to the stay rod. The bracket for the wires is inverted, the wiring put through it, and the bracket set at the proper height to take up the slack in the wires. The steel strip is then bent at right angles and a hole is drilled for the bracket, which is bolted to it. The strip is again bent to extend down to a cylinder-head capscrew on the left-hand side, and finally a hole drilled through the strip for the screw.—E. T. Gunderson, Jr., Humboldt, Iowa.

Uses for Old Auto Plates

Old auto plate numbers can be used to good advantage as shown in the drawing. Cut the plates with a hacksaw or heavy tin shears and use the numbers for rural mail boxes, for sprinkler systems or for house numbers. They are large and plain, which makes them especially suitable for these purposes. To attach them, it may be necessary to punch holes and wire them in place, as around pipes, or



Old Automobile Numbers Can Be Put to Many New Uses, Such as Illustrated Here

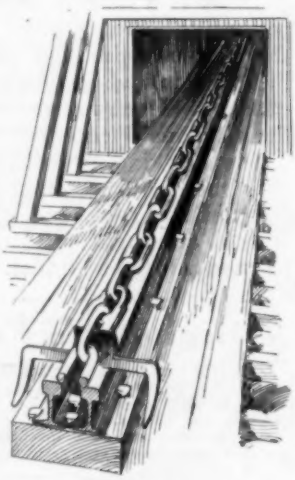
they can be riveted to thin metal surfaces such as a mail box, while, if they are to be used on a wooden surface, such as a porch post, nailing will do.—Truman R. Hart, Ashtabula, Ohio.

Cane Tube for Fly-Rod Tips

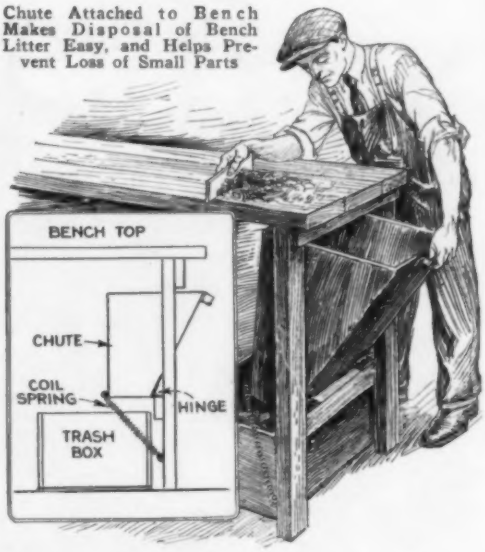
Ordinarily the tips of a fly rod are carried with the rest of the sections of the rod in a cloth case. While they are not often broken, they must nevertheless receive special attention while being carried about. A special tube that can be made at home and that will protect the tips from being broken consists of a piece of ordinary cane pole cut long enough to accommodate the sections of the rod. The inside of the tube should be at least ½ in. in diameter and the obstructions at the joints can be removed with a ¼-in. chisel or gouge attached to the end of a hardwood stick. After the obstructions have been removed, the inside surface of the tube should be smoothed down, which can be done by means of some emery cloth tacked to the end of the stick. A wooden plug is glued in one end of the cane and a cork is inserted at the other end. If desired, the threaded section of a narrow-neck can may be cut off and tacked on the end so that a screwcap can be used instead of the cork, and this is less likely to be accidentally lost. The tube is slipped into the cloth case along with the thicker sections of the rod.

Rails as Guides for Endless Chain

At a large southern sawmill using a heavy endless chain to pull logs from the pond up into the mill house, a guide or track for the returning chain was made of railway rails. Any number of rails can be coupled together, laying them side by side as shown in the drawing. The lags of the chain slide on the rails beside them, while the vertical links pass between the rails and prevent the chain from twisting.—L. M. Jordan, Vredenburgh, Ala.



Chute Attached to Bench Makes Disposal of Bench Litter Easy, and Helps Prevent Loss of Small Parts



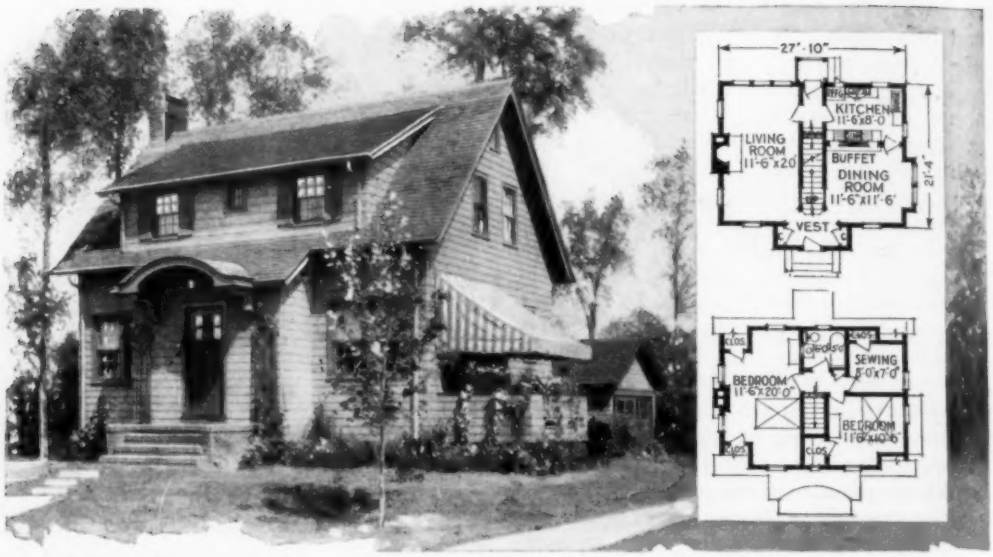
Trash Box under Bench Is Aid in Small Shop

The open can or box generally used for sweepings from the bench in a small shop has one great disadvantage: that small tools and parts may easily drop into it unnoticed. A box and chute that has all the advantages of the open-top box and none of its disadvantages is shown in the illustration. The construction of the chute itself is simple and is quite plain from the drawing. It is hinged to one of the crosspieces of the bench, as indicated, and is normally held under the bench by means of a strong spring attached to the rear edge. To use, the upper edge of the chute is pulled out and the trash swept into it. It will be noticed that the chute is not attached to the box, and consequently the trash can be thrown out without disturbing the former.

Sidetracking Engine Gases

When an automobile engine becomes worn from much use, some of the gas leaks by the rings and is discharged through the breather pipe, thus finding its way into the car body, making the air foul. To stop this, one autoist attached a flexible metal conduit to the breather-pipe opening and a short piece of rubber hose to the other end of the conduit. This hose was led outside under the engine hood and discharges all the gases into the air.

Is This Your Home?



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Plan No. 5A23

QUESTIONS regarding home building addressed to this magazine will be answered by The Architects' Small House Service Bureau of the United States, Inc., controlled by the American Institute of Architects and endorsed by the United States department of commerce. Inclose 10c and self-addressed envelope. Blueprints, specifications and material list for the house shown here may be obtained at nominal cost. Inclose self-addressed stamped envelope for reply. If further information is desired, send 5c and stamped envelope for a 24-page booklet explaining how the Small House Service Bureau functions and showing 12 sample plans. A new booklet, entitled "Fifty Ways to Lower Home Building Costs," illustrated by ten bureau houses actually lived in, and showing how as much as $1,000 can be saved on a home, may be obtained for 20 cents.

THE home illustrated above will gladden the hearts of home builders because of its spacious, comfortable, conveniently arranged plan. It is designed on simple, effective lines, that insure its being moderate in building cost and pleasing in appearance.

The fireplace in the living room and the combination built-in dining-room buffet and kitchen cabinet are features that will increase value and convenience beyond the money they cost. It is a well-known fact also that a fireplace adds considerably to the selling value of a house.

The kitchen is arranged after that of a design chosen from a national competition. However expertly this may have been designed to eliminate extra steps, many persons prefer to have the sink under the outside wall. The plans therefore provide an alternative drawing for such an arrangement of the fixtures.

There is a built-in buffet in the dining room. Graceful plaster arches between the dining room and vestibule and the living room and vestibule lend an unusual charm to these rooms as well as give them the spacious open effect so much desired.

The working drawings call for frame construction, brick front steps, shingle or composition roof, and exterior finish of stucco, although siding or shingles may be used with good effect.

Home Builders' Questions

Q. What makes a fireplace smoke? How do you fix it? A. The flue may be too small, or crooked, or it may be filled with soot. Also, the throat may be too small or the fireplace may be too high for its depth. Clean the flue; put in a mechanical throat; build up the back hearth one course of brick—get a contractor to tell you which.

Q. We wish to buy some property in our city. How far back is it necessary to trace the title? A. The abstract of title should be carried back to the original grant of the land from the government. Make sure that every transaction has been closed and that all claims against the property have been satisfied legally.

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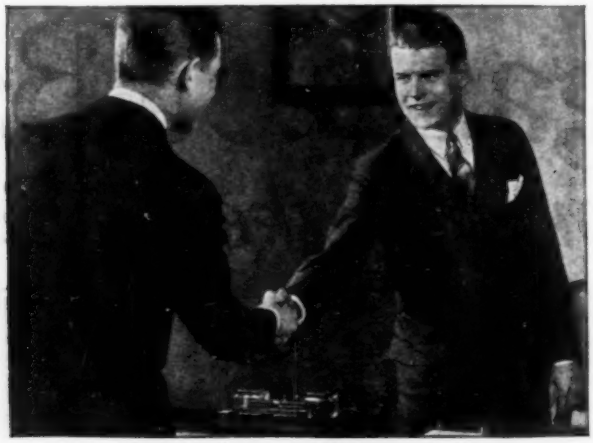

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try this invigorating massage after shaving

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Wash your hands thoroughly. Rub a little Pompeian Massage Cream into the back of your hand until the cream first disappears, then comes out again. Notice this —*the cream goes in pink and comes out black!*

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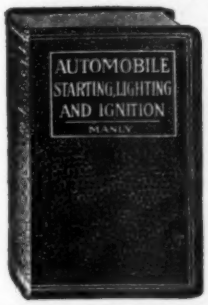

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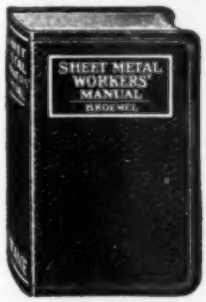

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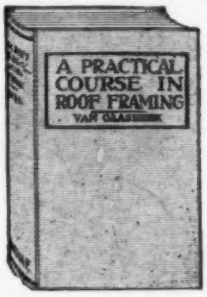

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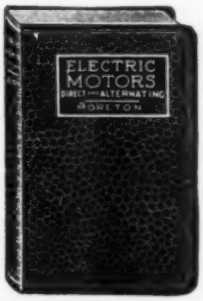

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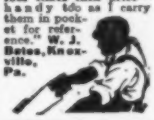
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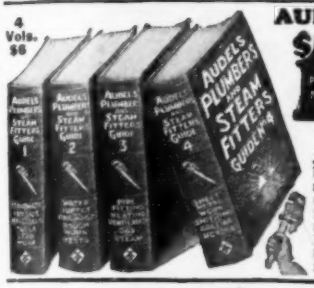

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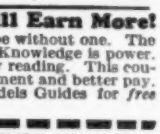
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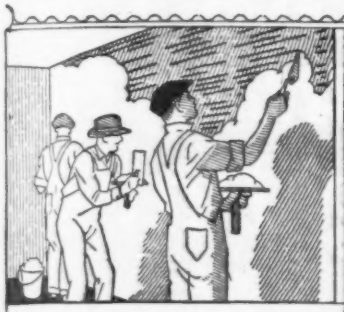
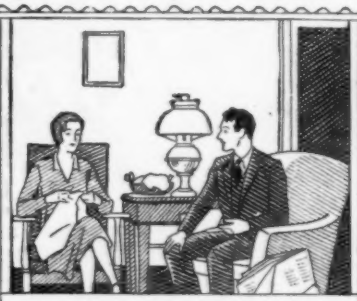


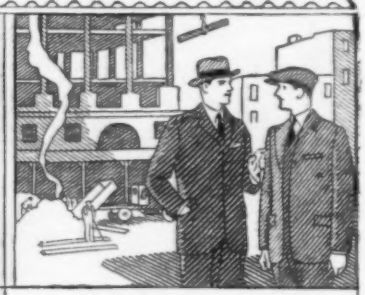
Worked for Small Salary

Henry J. Beilman had little education and little opportunity to get ahead, but he refused to give up. Deep within him was the longing to make something of his life before it was too late—to *build* a building some day instead of tinkering around it as a plasterer or bricklayer.



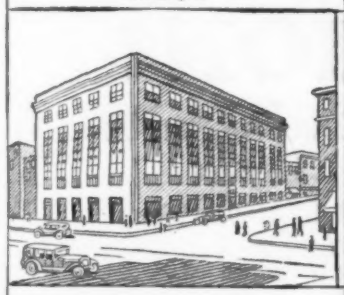
Resolves to Earn More Money

"If spare time study can help other men to get out of the rut," he said, "it can help me. I'm going to take up a course with the International Correspondence Schools and study at home. It's the only way I can ever hope to put myself on a par with technically trained men."



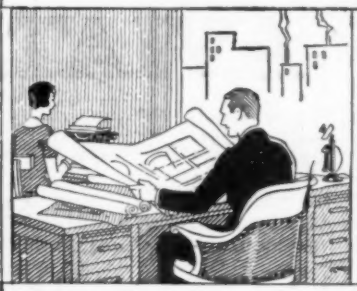
Gets Offer from Contractor

Beilman's friends laughed at him and said he was wasting his time, but he kept right on studying, for he could see how the course was helping him in his work. Soon one of the leading contractors heard about "this bright young man" and made him superintendent at a fine increase in salary.



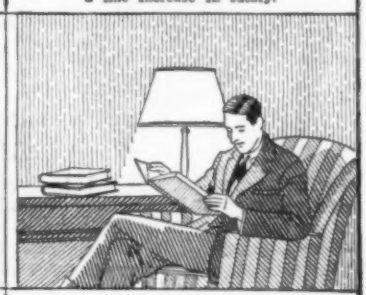
Secures Big Contract

Beilman went ahead so rapidly that he decided to start a business of his own. He met with unusual success from the very start and today his income is "more than $12,000 a year." Recently he handled the contracting work of the new $800,000 Chamber of Commerce building in Scranton.



Glad He Studied at Home

"I give the International Correspondence Schools full credit for my success," Mr. Beilman writes; "there is nothing better for the man who has been deprived of the advantages of a college education. Many of my friends also give the I. C. S. full credit for their ability to do their work efficiently and well."



The Secret of His Success

Henry J. Beilman is a successful man today because he had vision—ambition—and perseverance. He realized that he had to *learn* more before he could *earn* more. Instead of just drifting along, he picked a definite goal and then worked and strived until he made his dreams come true.

MAIL THIS COUPON FOR FREE BOOKLET

INTERNATIONAL CORRESPONDENCE SCHOOLS, Box 5651-E, Scranton, Penna.

Without cost or obligation, please send me one of your booklets and tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- ☐ Business Management
- ☐ Industrial Management
- ☐ Personnel Organization
- ☐ Traffic Management
- ☐ Business Law
- ☐ Banking and Banking Law
- ☐ Accountancy (including C.P.A.)
- ☐ Nicholson Cost Accounting
- ☐ Bookkeeping
- ☐ Private Secretary
- ☐ Spanish
- ☐ French
- ☐ Salesmanship
- ☐ Advertising
- ☐ Business Correspondence
- ☐ Show Card Lettering
- ☐ Stenography and Typing
- ☐ Good English
- ☐ Civil Service
- ☐ Railway Mail Clerk
- ☐ Common School Subjects
- ☐ High School Subjects
- ☐ Illustrating
- ☐ Cartooning

TECHNICAL AND INDUSTRIAL COURSES

- ☐ Electrical Engineering
- ☐ Electric Lighting
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machine Shop Practice
- ☐ Railroad Positions
- ☐ Gas Engine Operating
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Metallurgy
- ☐ Steam Engineering
- ☐ Radio
- ☐ Architect
- ☐ Blueprint Reading
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Concrete Builder
- ☐ Structural Engineer
- ☐ Chemistry ☐ Pharmacy
- ☐ Automobile Work
- ☐ Airplane Engines
- ☐ Navigation
- ☐ Agriculture and Poultry
- ☐ Mathematics

Name .....

Address .....

© 1927

Canadian address—International Correspondence Schools Canadian, Limited, Montreal

THEN CHOOSE AVIATION!

ARE you a red-blooded, daring he-man? Are you eager for a life of constant thrills, constant excitement and fascinating events? Do you crave adventure, popularity, admiration, and the applause of great crowds? Then why not get into the Aviation Industry—the greatest adventure since time began—the greatest thrill ever offered to man?

Think what Aviation offers you. Thrills such as you never had before! The praise and plaudits of the multitude. Ordinary salaries from $75 to better than $400 a week! And a chance to get in on the ground floor where rewards will be unlimited!

Aviation is growing so swiftly that one can hardly keep track of all the astonishing new developments. Airmail routes have just been extended to form a vast aerial network over the entire U. S. Airlines and airplane factories are springing up all over the country. Men like Henry Ford are investing millions in the future of commercial Aeronautics in America! The possibilities are so tremendous that they stagger imagination!

Everything is set for the greatest boom in history. The fortunes that came out of the automobile industry and out of motion pictures will be nothing compared to the fortunes that will come out of Aviation! There is just one thing holding it up:—lack of trained men! Even in the beginning thousands will be needed—and generously paid. The opportunities open to them cannot be overestimated. Those who qualify quickly will find themselves on the road to undreamed of money—success—popularity—and prominence!

Pick Your Job!

- Airplane Instructor
- Airplane Engineer
- Airplane Repairman
- Airplane Assembler
- Airplane Mechanician
- Airplane Inspector
- Airplane Builder
- Airplane Salesman
- Exhibition Manager
- Airplane Contractor
- Airplane Motor Expert
- Airplane Designer

Easy to Become an Aviation Expert

$50 to $100 a Week

Get into this thrilling profession at once while the field is new and uncrowded. Now—by a unique new plan—you can quickly secure the basic training for one of these wonderful high salaried jobs, at home, in spare time. Experts will teach you the secrets—give you all the inside facts that are essential to your success. And, the study of Aviation is almost as fascinating as the actual work itself. Every lesson is chock-full of interest—and so absorbing that you actually forget you are studying. But best of all are the ultimate rewards you are fitting yourself to gain!

Send for FREE Book

Send the coupon for our new, free book, just out—"Opportunities in the Airplane Industry". It is vitally interesting, reads like a romance and tells you things about this astonishing profession you never even dreamed of. This book is so fascinating it could easily sell for a dollar. We offer a limited number FREE. Write for yours today.

American School of Aviation
Dept. 135-A, 3601 Michigan Ave., Chicago, Ill.

AMERICAN SCHOOL OF AVIATION,
Dept. 135-A, 3601 Michigan Ave., Chicago, Ill.

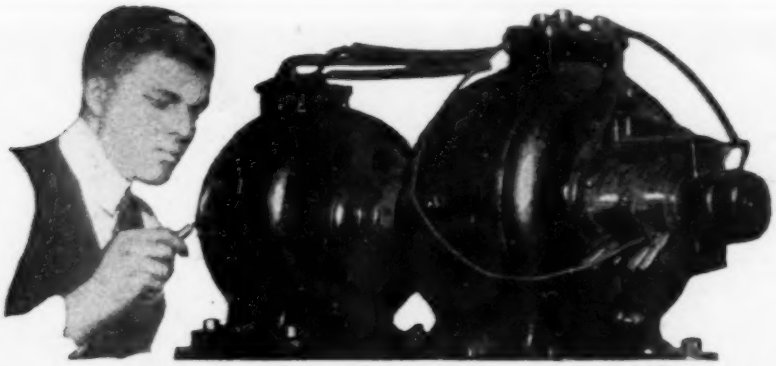
Without any obligation please send me FREE book "Opportunities in the Airplane Industry." Also information about your course in Practical Aeronautics.

Age.....

Name.....

Address.....

City.....State.....



Amazingly Easy Way to get into ELECTRICITY

Don't spend your life waiting for $5 raises in a dull, hopeless job. Now . . . and forever . . . say goodbye to 25 and 35 dollars a week. Let me teach you how to prepare for positions that lead to $50, $60 and on up to $200 a week in Electricity—NOT by correspondence, but by an amazing way to teach that makes you a Real Electrician in 90 days! Getting into electricity is far easier than you imagine!

Learn Without Lessons in 90 DAYS

LACK of experience—age, or advanced education bars no one. I don't care if you don't know an armature from an air brake—I don't expect you to! It makes no difference! Don't let lack of money stop you. Most of the men at Coyne have no more money than you have. That's why I have worked out my astonishing offers.

I PAY Your Railroad Fare When You Enroll

I pay your railroad fare to Chicago, and assist you to part time work while training. Then, in 12 brief weeks, in the great roaring shops of Coyne, I train you as you never dreamed you could be trained . . . on one of the greatest outlays of electrical apparatus ever assembled . . . real dynamos, engines, power plants, autos, switchboards, transmitting stations . . . everything from doorbells to farm power and lighting . . . full-sized . . . in full operation every day!

No Books—No Printed Lessons

No dull books, no baffling charts . . all real actual work . . . building real batteries . . . winding real armatures, operating real motors, dynamos and generators, wiring houses, etc., etc. That's a glimpse of how we help to make you a master electrician, teaching you far more than the average ordinary electrician ever knows and fitting you to hold big jobs after graduation.

JOBS OPEN

Here are a few of hundreds of positions open to Coyne-trained men. Our free employment bureau puts you in touch with openings to choose from.

Armature Expert	$100 a Week
Substation Operator	$65 a Week
Auto Electrician	$110 a Week
Inventor - -	Unlimited
Maintenance Engineer	$150 a Week
Service Station Owner	$200 a Week
Radio Expert -	$100 a Week

Jobs, Pay, Future

Don't worry about a job, Coyne training settles the job question for life. Big demand for Coyne trained men. Our employment bureau secures dozens of positions weekly. Two weeks after graduation, Clyde F. Hart got a position as electrician with the Great Western Railroad at over $100 a week. That's not unusual. We can point to many Coyne men making up to $800 a month. $60 a week is only the beginning of your opportunity. You can go into radio, battery or automotive electrical business for yourself and make up to $15,000 a year.

Get the Facts

Coyne is your one great chance to get into electricity. Every obstacle is removed. This school is 28 years old—Coyne training is tested—proven beyond all doubt—endorsed by electrical industry. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs . . . facts . . . jobs . . . salaries . . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

Get this FREE Book

COYNE ELECTRICAL SCHOOL
H. C. LEWIS, Pres.
Dept. A7-72
1300 W. Harrison St., Chicago, Ill.
Founded 1899

Mr. H. C. Lewis, Pres.,
COYNE ELECTRICAL SCHOOL, Dept. A7-72
1300 W. Harrison St., Chicago, Ill.
Dear Mr. Lewis:

Without obligation send me your big free catalog and all details of your Railroad Fare to Chicago offer, Free Employment service, Radio and Automotive Courses without extra cost, and how I can "earn while learning." I understand I will not be bothered by any salesman.

Name.....

Address.....

City.....State.....

$2500 Reward!

For the Capture of an Unknown Man

Twice he had entered the St. Clair Mansion. What was he after? Who? What was in danger?

Berteau, the famous detective, had warned St. Clair *that the mysterious marauder would come again.* And now—a noise in the passage! The creak of an opening door. A shot in the dark! A capture!

Is this wounded stranger the mysterious intruder? Who could tell? Yet Berteau identified the man without hesitation and won the $2500 reward.

How did he do it? Easy enough for the Finger Print Expert. He is the specialist, the leader, the *cream* of detectives. Every day's paper tells their wonderful exploits in solving mysterious crimes and convicting dangerous criminals.

More Trained Men Needed

The demand for trained men by governments, states, cities, detective agencies, corporations, and private bureaus is becoming greater every day. Here is a real opportunity for YOU. Can you imagine a more fascinating line of work than this? Often life and death depend upon finger print evidence—and big rewards go to the expert. Many experts can earn regularly from $3,000 to $10,000 per year.

Learn at Home in Spare Time

And now you can learn the secrets of this science at home in your spare time. Any man with common school education and average ability can become a Finger Print Detective in a surprisingly short time.

Course in Secret Service FREE

UNIVERSITY OF APPLIED SCIENCE
Dept. A-135—1920 Sunnyside Ave., Chicago, Illinois

Gentlemen:—Without any obligation whatever, send me your new, fully illustrated, FREE book on Finger Prints and your offer of a FREE course in Secret Service Intelligence and the Free Professional Finger Print Outfit.

Name .....

Street Address .....

City and State .....

For a limited time we are making a special offer of a ***professional Finger Print Outfit, absolutely Free, and Free Course in Secret Service Intelligence.*** Mastery of these two kindred professions will open a brilliant career for you.

Write quickly for fully illustrated free book on Finger Prints which explains this wonderful training in detail. Don't wait until this offer has expired—mail the coupon now. You may never see this announcement again! You assume no obligation—you have everything to gain and nothing to lose. Write at once—address

University of Applied Science
Dept. A-135 1920 Sunnyside Avenue, Chicago, Illinois

They Thought I Was Trying to be Funny—

Until I Started to Play — Then I Gave Them the Surprise of Their Lives

THE crowd sat spellbound. Harry had just played the violin—beautifully. With mock dignity I arose.

"With your kind permission," I announced, "I shall now charm you with a piano recital."

Everyone snickered. They were sure I couldn't play a note. "Does he really play?" one girl asked. "Yes," Phil laughed, "he plays the Victrola—beautifully!"

With studied clumsiness, I fell over the piano stool. Then I proceeded to pick out "Chop Sticks" with one finger! The crowd laughed. This was the dramatic moment for my surprise. Dropping the mask of the clown, I struck the first sweet chords of Wagner's lovely "The Evening Star" from "Tannhauser."

The laughter died on their lips. The magic of my music cast a spell over everyone. As I played on with complete confidence, I forgot the room—the people—everything. I was alone—lost in the sheer beauty of the immortal master's tender melodies.

The Thrill of My Life

When the last notes had faded away, there was a roar of applause. Then came questions and congratulations from my dumbfounded friends — "How long have you been playing?"—"Who was your teacher?"—"Where did you learn?"

"I know it is hard to believe," I replied, "but I learned at home—*and without a teacher!*"

Then I told them the whole story.

"I have always wanted to play the piano. But I never had a chance to take lessons. Then one day I saw an interesting ad. It told about a new, easy way of learning music—right at home—without a teacher. I sent for the Free Demonstration Lesson and Booklet.

"When they arrived, I was amazed to see how easy playing the piano really was. I decided that I would send for the course and practice secretly. Then I could surprise you all.

Pick Your Instrument

Piano
Organ
Violin
Drums & Traps
Guitar
Mandolin
Harp
Cornet
Piccolo
'Cello
Harmony and Composition
Sight Singing
Ukulele
Hawaiian Steel Guitar
Clarinet
Flute
Saxophone
Trombone
Voice and Speech Culture
Automatic Finger Control
Piano Accordion
Banjo (5-String, Plectrum and Tenor)

Just a Few Minutes a Day

"The course was as fascinating as a new game. I enjoyed every minute of it. I was playing real tunes from the start, by **note.** Reading music was as easy as A-B-C! No weary scales, no monotonous exercises, no tiresome hours of practicing. Soon I could play jazz, ballads, classical music—all with equal ease."

You, too, can learn to play your favorite instrument by this easy "at home" method that has taught almost half a million people. There's nothing marvelous about it. It's just a common sense practical method—so simple you don't have to know the slightest thing about music. You find your progress amazingly rapid because every step is clear and easy to understand. Just pick out the instrument you want to play. The U. S. School of Music does the rest. And its cost averages just a few cents a day!

Free Book and Demonstration Lesson

Our illustrated free book and free demonstration lesson explain all about this remarkable method. They prove how anyone can learn to play his favorite instrument in almost no time.

If you really want to learn to play, take this opportunity to make your dreams come true. Sign the coupon below. Instruments supplied when needed, cash or credit. U. S. School of Music, 76 Brunswick Bldg., New York.

U. S. SCHOOL OF MUSIC,
76 Brunswick Bldg., New York City

Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane, Demonstration Lesson and particulars of your Special Offer. I am interested in the following course:

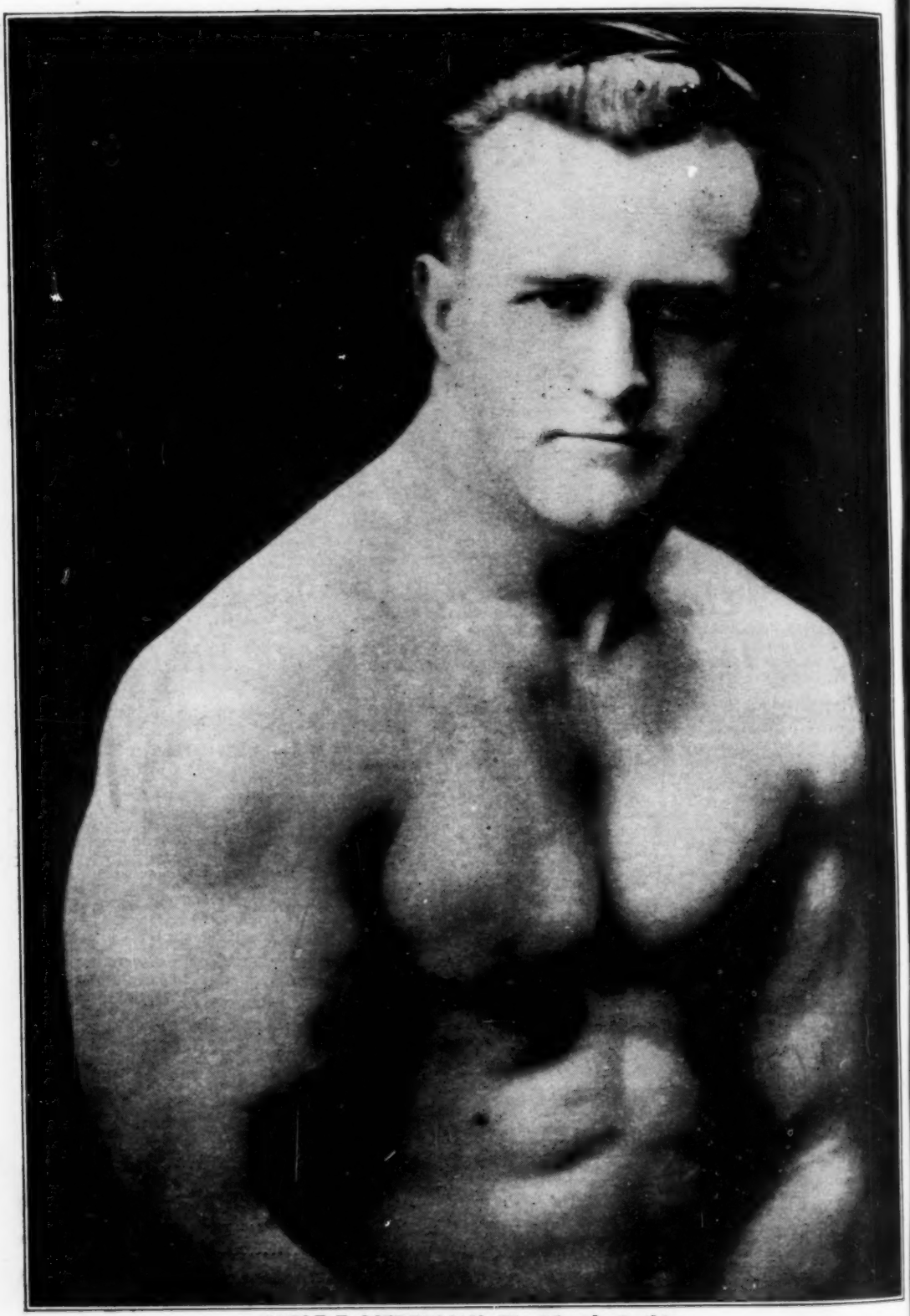
.....

Have you above instrument?.....

Name.....

Address.....

City.....State.....



EARLE E. LIEDERMAN, *The Muscle Builder*
Author of "Science of Wrestling," "Muscle Building," "Secrets of Strength," "Here's Health," "Endurance," etc.

Kill This Man!

THERE'S a devil inside of you. He's trying to kill you. Look out for him! He tells you not to work so hard. What's the use? the boss only piles more work on you. He tells you not to bother with your body. If you're weak—you always will be weak. Exercise is just a lot of rot. Do you recognize him? Of course you do. He's in us all. He's a murderer of ambition. He's a liar and a fool. *Kill him!* If you don't, he will kill you.

Saved

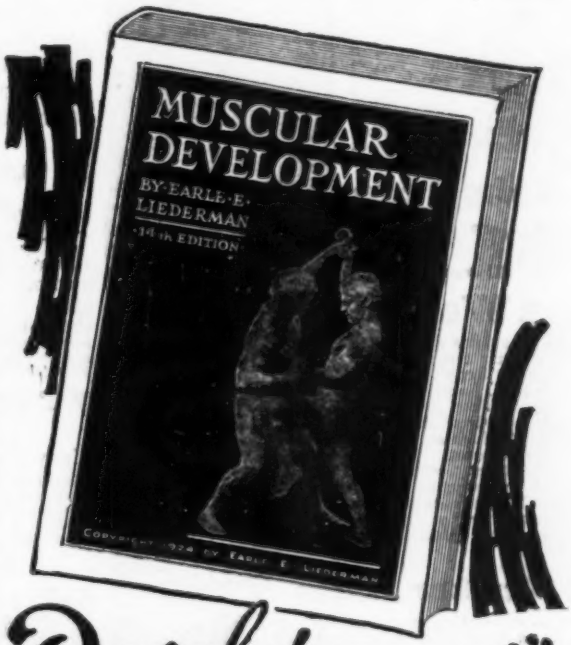
Thank your lucky stars you have another man inside of you. He's the human dynamo. He fills you full of pep and ambition. He keeps you alive—on fire. He urges you on in your daily tasks. He makes you strive for bigger and better things to do. He makes you crave for life and strength. He teaches you that the weak fall by the wayside, but the strong succeed. He shows you that exercise builds live tissue—live tissue is muscle—muscle means strength—strength is power. Power brings success! That's what you want, and gosh darn your old hide! you're going to get it.

Which Man Will It Be?

It's up to you. Set your own future. You want to be the Human Dynamo? Fine! Well, let's get busy. That's where I come in. That's my job. Here's what I'll do for you:

In just 30 days I'll increase your arm one full inch with real live, animated muscle. Yes, and I'll add two inches to your chest in the same time. Pretty good, eh? That's nothing. Now come the works. I'll build up your shoulders. I'll deepen your chest. I'll strengthen your whole body. I'll give you arms and legs like pillars. I'll literally pack muscle up your stomach and down your back. Meanwhile I'll work on those inner muscles surrounding your vital organs. You'll feel the thrill of life shooting up your old backbone and throughout your entire system. You'll feel so full of life you will shout to the world, "I'm a man and I can prove it!"

Sounds good, what? But listen! That isn't all. I'm not just promising these things. *I guarantee them!* It's a sure bet. Oh, boy! Let's ride.



Send For My New 64 Page Book "Muscular Development"

IT IS FREE

What do you think of that? I don't ask one cent. And it's the peppiest piece of reading you ever laid your eyes on. I swear you'll never blink an eyelash till you've turned the last cover. And there's 48 full-page photos of myself and some of my prize-winning pupils. This is the finest art gallery of strong men ever assembled. And every last one of them is shouting my praises. Look them over. If you don't get a kick out of this book, you had better roll over—you're dead. Come on, then. Take out the old pen or pencil and sign your name and address to the coupon. If you haven't a stamp, a postal will do. But snap into it. Do it *now*. Tomorrow you may forget. Remember, it's something for nothing and no strings attached, no obligation. *Grab it!*

EARLE E. LIEDERMAN
Dept. 2006, 305 Broadway, New York City

It Is FREE

DON'T SEND ONE PENNY — YOUR NAME AND ADDRESS ON A POSTAL WILL DO

EARLE E. LIEDERMAN
Dept. 2006, 305 Broadway, New York City

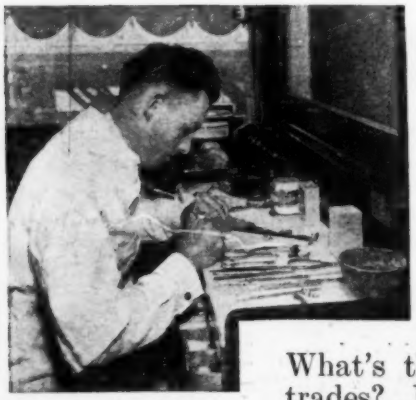
Dear Sir: Please send me, absolutely FREE and without any obligation on my part whatever, a copy of your latest book, "Muscular Development."

Name.....

Street.....

City.....State.....

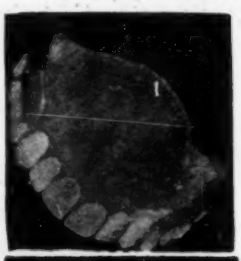
(Please write or print plainly.)



This Dental Laboratory Expert earns UP TO $20 a day!

What's the use of training for the old, overcrowded trades? If you're going to prepare for big-salaried jobs or a profitable business of your own GET INTO THE FASTEST GROWING PROFESSION—*"Laboratory Dentistry."* Biggest opportunity for success of the century, because there are many more jobs than there are experts to fill them, because there are a dozen cities crying for Laboratories for each EXPERT capable of operating one!

Easiest, pleasantest work you ever saw! Your own boss, money and success yours from the very beginning. You can start with a "shoe-string." We prepare you in a few months to run a business of your own, to do any job. Common schooling, ability to use your fingers ALL YOU NEED! R. R. Fare to Chicago, Cleveland, Detroit, Boston or Philadelphia deducted from cost of course for a limited time!



Jobs Up to $125 a Week!

In a business where there are many times as many jobs as Experts, salaries are high, hours are easy, opportunities are everywhere! Dentists recognize the high-standing of our graduates. No books here—learn with tools and instruments. Start quick—get ready in a few months for your big opportunity! *Mail Coupon today!*

R-R-FARE TO Chicago Cleveland Detroit Boston or Phila. DEDUCTED from TUITION

64,000 DENTISTS NEED LABORATORY WORK!

Only a few hundred Laboratories in all the U. S.—most of them in the larger cities. Dentists can't afford to do their own mechanical jobs. They can buy the services of a Laboratory Expert at about $3.00 an hour and sell their own time at $6 to $15 an hour. Dentists will encourage you to learn mechanical Dentistry, start a "Lab" of your own, give them quicker service than sending their work to other cities. Dentists can't wait and keep their patients waiting. Ask your Dentist.

WE HELP YOU OPEN A LABORATORY OF YOUR OWN!

Many of our graduates open a Laboratory of their own. To encourage more men to go into this wonderful Mechanical profession, we will help you find a good location for your Laboratory, and help you towards success. Write for complete information on how you can find yourself in a profitable business of your own after you become a Dental Laboratory Expert.

INTERESTING BOOK—FREE!

Right this minute there are openings for 150 Dental Laboratory Experts in locations where they can do a business of $5,000 to $20,000 a year. But you can't *cash in*, take advantage of these OPPORTUNITIES until you're *Trained*. Catalog tells you how quickly and easily you can *get ready*, how hundreds of others have SUCCEEDED! Tells you how you learn in a few months BY DOING ACTUAL LABORATORY JOBS in our famous *Dental Laboratory Schools*. Brings you R. R. Fare offer and other big inducements. *Write for free Book today!*

EARN while you LEARN! Day students make all or part cost of course by part-time night work. Night students can find plenty of good jobs "to see them thru." **We'll help you!**

McCarrie School of Mechanical Dentistry
1338 S. Michigan Ave.
Dept. 120 Chicago, Ill.

Rubber Plates

Learn to make partial upper or lower plates with soldered, cast or wire clasps, with palatal bars; with lingual bars. McCarrie-trained Students learn to make full rubber plates of every type, including Vulcanite base-plates, butted gums, carved gums, etc.

CROWNS

Here's only a small part of your practical training in Crown-work: Two-piece, seamless, open-face, Richmond, cast-base porcelain, Carmichael, split-pin, carved (swaged) cusp, cast cusp, etc.

BRIDGE WORK

Complete training in both fixed and removable bridgework. Interchangeable teeth, gold dummy, Sanitary porcelain dummy jobs—Roach, Gilmore, Bischoff and all forms of cast-clasp work is taught—not with books but in *actual Laboratory*.

METAL BASE DENTURES

Cast bases of Aluminum, Watt's metal, etc., are included in your training. Both centrifugal and air pressure casting machines are used. Free Book contains complete list of subjects in course.

McCarrie School of Mechanical Dentistry
1338 S. Michigan Ave., Dept. 120, Chicago, Ill.

Without obligation, please send me your *R. R. fare offer* and free Book with complete information about how I may become a Mechanical Dentist. How you will help me open a Laboratory, how you will help me find a job while I take my training, etc.

Name.....

St. No. or R. F. D.....

City.....State.....

Raised My Pay 700%

This Amazing Book Showed Me How

This is Perhaps the Most Remarkable Book Ever Printed. It Has Proved the Turning Point in the Careers of Thousands Who Were Ambitious for Bigger Pay! If You Ever Aspired to Earn $10,000 a Year or More—Read it Without Fail!

CAN you imagine how a man feels when his earning capacity quickly jumps 700% in a few months? Can you imagine how *you* would feel if your salary suddenly became *seven times* greater than ever before?

That is exactly what happened to O. A. Jones of Missouri, after reading the amazing book pictured above. Between its covers, he discovered something he had never even dreamed of before—a certain force that lifted him out of the routine rut and set him on the road to $10,000 a year!

Unusual? Not at all. This surprising book has done the same for hundreds of others. For example: C. W. Birmingham of Ohio read it and jumped from $15 a week to $7,500 a year. Wm. Shore of California, read it and commenced earning as high as $525 a week. C. V. Champion of Illinois read it and became President of his company at a salary exceeding $10,000 a year!

THE SECRET OF BIG EARNINGS

How did they do it? What did the book show them? Just this: Every one of these men realized that a knowledge of salesmanship and the *ability to sell* brings bigger rewards than anything else in modern business today! But until they saw the contents of this book—"Modern Salesmanship"—they had no idea that they, *too*, could win quick success through salesmanship. They believed that this golden field of endeavor was forever barred to them. But they were wrong—and this unusual book opened the way to the success that they had formerly despaired of attaining!

SALESMEN ARE MADE—NOT BORN!

Yes! Any man of ordinary intelligence can become a successful salesman! Just as you learned the alphabet, you can master the secrets of selling as taught by the National Salesmen's Training Association.

Reason it out for yourself. Salesmanship is governed by rules and laws. There are certain ways of saying and doing things to make men act as you want them to: certain ways of getting exactly what you go after! Once you have mastered these fundamental rules, your success is governed only by your energy and ambition!

BIG DEMAND FOR TRAINED SALESMEN

City and traveling sales positions are open in every line all over the country. For years, thousands of leading firms have called on the N. S. T. A. to supply them with salesmen. Employment service is free to both employers and members and thousands have secured positions through this service.

FREE TO EVERY MAN

If we were asking two or three dollars a copy for "Modern Salesmanship," you might hesitate. But it is now FREE. We cannot urge you too strongly to take advantage of this opportunity to see for yourself what salesmanship has done for others—and what the National Salesmen's Training Association stands ready and willing to do for you. No matter what your opinion is now, "Modern Salesmanship" will give you a new insight into this fascinating and highly-paid profession.

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Age.....Occupation.....

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A Paint Shop of Your Own in Sight!

Little capital needed to start a small shop when you know how to do a professional job of painting and spraying. As profits roll in you can buy spraying equipment, employ helpers and branch out. Hundreds of the largest paint shops in the U. S. started with half a dozen brushes and a few cans of material. My 13 outfits illustrated below include sufficient tools to make a start in a shop of your own.

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Paint and Duco experts are always sure of a well-paid job. That's one branch of auto work never crowded. Twenty million autos, trucks, tractors, busses and taxis need repainting every couple of years.

Paint and Duco experts earn big salaries. Finishers earn $75 to $125 a week. Painters and sprayers earn $50 to $90 a week. Plenty of jobs—everywhere—all the time in auto painting, and the work's easy and pleasant. Here is an uncrowded field that assures your success.

Learn in a Few Months at Home!

13 Outfits of Tools and Materials Included

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I send you panels of metal and wood to prime, surface, paint, varnish, stripe, etc. I supply sandpaper, chamois, all kinds of brushes, scrapers and other tools—all without extra charge. I start you off by doing actual painting jobs. I guarantee that you can learn quickly and easily. Satisfaction or money refunded is my method. My course includes shop-tickets, shop-lectures, work-tickets, etc. And I tell you how to go out and get the business, how to run it, how to keep order and cost records, etc. It would take **many years** of actual experience and twice the time and three times the cost at a trade school to learn all branches of the work as I give it to you AT HOME in your spare time.

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Send sample shop-tickets free and information on how I may learn auto painting and Duco at home in spare time.

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Would You Sign This CONTRACT?

I HEREBY agree and bind myself to stay at my present job for the term of *ten years from this date,* at the same salary I am now drawing.

Signed: _____

Ask Yourself This Vital Question:

In ten years will you still be meeting the same competition on the same ground, with the only difference that you yourself are older, more discouraged?

If you wouldn't sign a contract to "stay put" for the next ten years, what are you doing to get hold of a better place? If you aren't doing anything, you might as well sign the contract as not—you'll be there anyway.

In the last few years a vast new industry has opened up, offering thousands of new opportunities to all sorts of men. If you will train yourself to hold its good jobs you can find a better future here. This industry still needs men—many of them—in more than twenty different lines of work. The work is more than interesting, it's fascinating—so much so that thousands dabble with it just for the pleasure it gives them. This industry is RADIO.

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A 64-page book, full of facts, photos, and general information on the opportunities in this new field, will be sent to you free on request. Previous experience in Radio is not necessary—when we prepare you for the Radio profession we do the job thoroughly from the beginning. While the necessary training can be obtained in a space of a few months, it is absolutely complete and thorough. It is also clear and easily-learned—men of practically no education often take it up and master it.

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You owe to yourself and to your future to look into this opportunity, and see exactly what it offers you. The book will be sent free—absolutely no obligation.

Would you sign **your** name in the contract above, and hand the contract to your employer? If you wouldn't, then look around for something better. Fill in the coupon below and take a look at Radio's offer.

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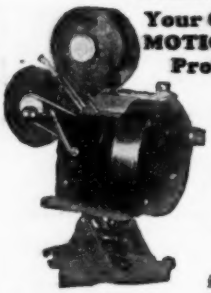

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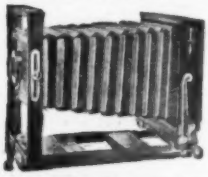

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Long before the lectures were over the reports began to come in showing how quickly his audiences had been taught to use this wonderful power.

"By your method of visualization I secured the funds to build my home," writes one of Dr. Bush's Chicago listeners. Mrs. Mary Roberts of Denver writes, "My salary was increased 40% in one week by following your psychological method—and my powers of salesmanship were DOUBLED." "TEN Thousand Dollars would not pay for the benefits I have received." James C. Smith of Somerville, Mass. writes him. Another says, "I was making no money, my health was bad and I was heavily in debt. Now I have a store of my own and am doing a good business. My family and myself enjoy the best of health." A man who learned of this power in Pittsburgh—he had never earned more than $25 per week—stepped out the first month and made over $1000. Dr. Bush has thousands of letters like these. They are his proudest possessions.

Partial List of Contents

- Psycho-Analysis and the Subconscious
- How to Have Amazing Memory
- How to Destroy Fear—Man's Worst Enemy—The Unseen World
- What is Love and How to Keep It
- How to Be Popular
- How to Overcome Failure and Adverse Environment
- How to Be Beautiful Through Mysterious Force
- Vibration—How to Win Success
- How to Develop Personality
- How to Conquer Illness
- Poverty a Disease — How to Overcome It
- How to Double Your Efficiency
- Visualization—How to Make Your Dreams Come True
- The Mastery of Fate
- How to Use Suggestion for Health, Success and Happiness
- The Greatest Law in the Universe, Just Lately Discovered, and How to Use It
- What the World Owes You and How to Get It
- After This Life What?—What is God?
- Smile, Smile, Smile
- Psychology of Health—Building the Body Beautiful
- Long Life and Full of Pep

His Teachings Now in Book Form

Dr. Bush's sole idea in giving these lectures is the same idea that actuated him in his earlier days before he had discovered this amazing new force. Then as an earnest and brilliant young minister of the Gospel he had refused honors and financial returns in order to apply his efforts where they would do good to the greatest number. His lectures given are for the same reason—to teach this new force to everyone who will learn. And to reach still more people he has incorporated his lectures in an absorbingly interesting book, "Applied Psychology and Scientific Living," which will be sent, on FREE TRIAL, to any earnest seeker after knowledge. Luther Burbank said, "Applied Psychology appears to me the most practical and useful work which has been published on these and similar subjects."

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But no description can begin to give you even an idea of the startling truths explained and proved in this wonderful book of over 500 pages. The very first page will be a revelation to you just as Dr. Bush's lectures have been a revelation to keen thinking, analytical minds in every city. One enthusiast says: "It can be understood by everyone. And if everyone would read it and then use this new force, humanity would advance 5,000 years overnight."

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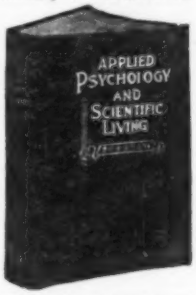

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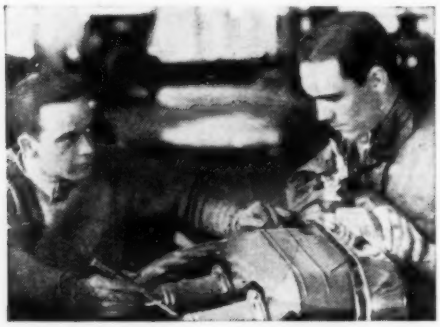

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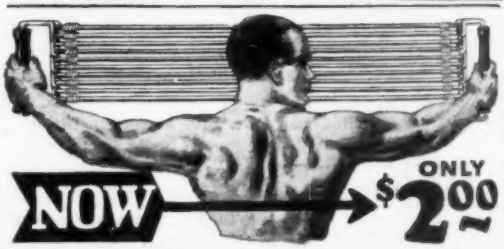

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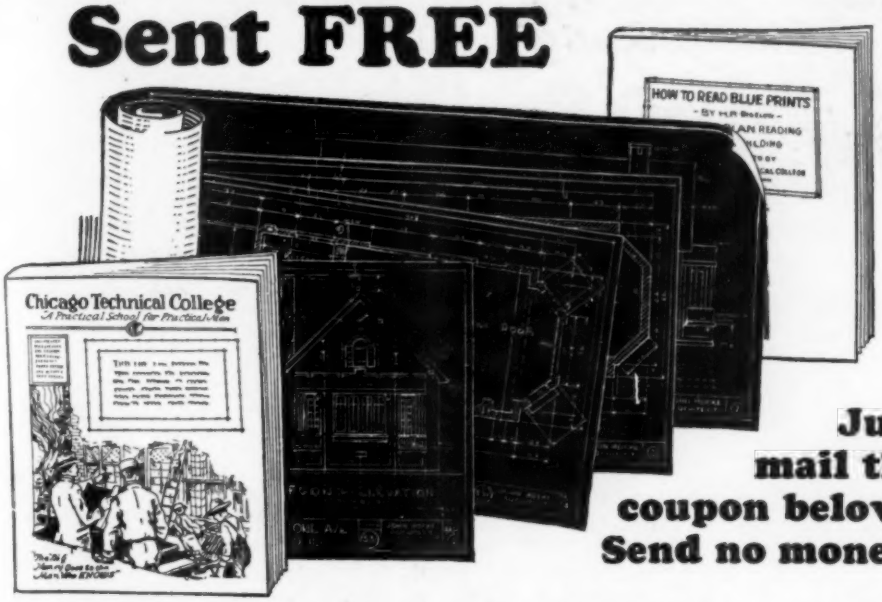

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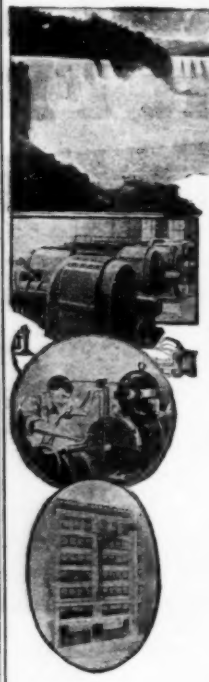

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They Thought I Was A Weak Sister -But I Took Their Breath Away!

ALL of a sudden the office was very quiet, as sometimes happens for an instant or two, and a few words reached me. "Oh, he won't dare kick," the manager was saying, "he's a pretty weak sister."

Mechanically I went on with my work, wondering vaguely who the weak sister could be. A new man had just been hired for our department and desks were being moved to make room for him. A minute later I looked up and saw the chief clerk standing at my side. "Bob," he crisply ordered, "move your desk back in that corner. I want this space for the new assistant I've hired." Then he turned and strode away.

I gulped and wilted down into my chair. *I* was the weak sister! And I was actually being demoted! The new man was being hired for *my* place! This was my reward for all my hard work—this was how I won out by waiting patiently for my turn to be promoted. I had even congratulated myself on my close-lipped, reserved manner—I thought I was showing strength of character by sticking to my work and not trying to push myself—to show off.

And that was the whole trouble. I had plenty of steel in my makeup, but I had no ability to express myself. I was timid, self-conscious, and actually afraid of my own voice. I would study out the office problems and find solutions for our difficulties, but I didn't know how to present these ideas to the man up ahead. Several of the boys who had started at the time I did were now department managers—because they had the knack of forceful speech, self-confidence and personality—the very qualities I lacked. It made me good and mad—and I resolved to show them—to get rid, once and for all of my timidity and shyness—my bashfulness and lack of poise.

In Fifteen Minutes a Day

And then suddenly I discovered a new easy method which made me into a good talker—a forceful and powerful speaker—almost overnight. I learned how to say just the right words at the right time, how to win and hold the attention of those around me, how to bend others to my will, how to dominate one man or an audience of thousands. My self-consciousness began to vanish. One morning I got up my courage and presented the manager and the chief clerks with a complete plan for rearranging our department—stating it simply and clearly, but in a pleasing, interesting and forceful way. I actually took their breath away—they were so amazed that they gave me full power to carry out my ideas!

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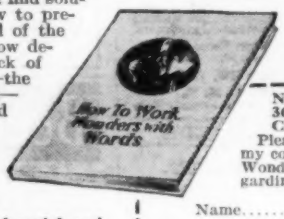

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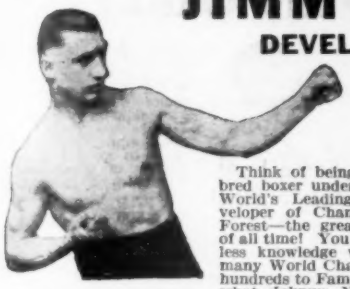

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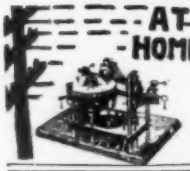

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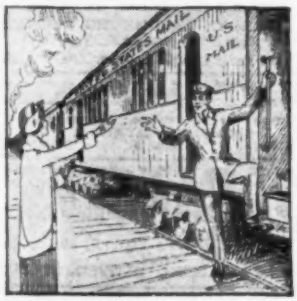

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Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). On runs they usually work three days and have three days off duty, or in the same proportion. During this off duty and vacation, their pay continues just as though they were working. When they grow old they are retired with a pension. As Railway Postal Clerks are continually traveling, they have an excellent chance to see the country. They are furnished with a railroad pass.

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Post Office Clerk	($1700-$2300)
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Clerk in Government Offices	($1140-$1860)
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Name.....

Address.....

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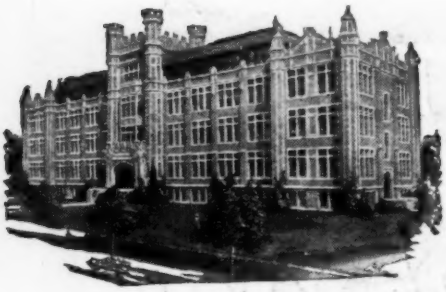

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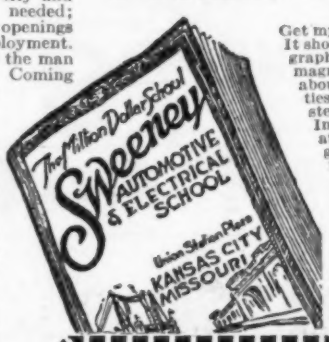

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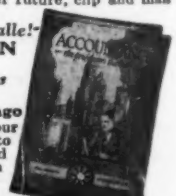

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Present Position .....

Address .....

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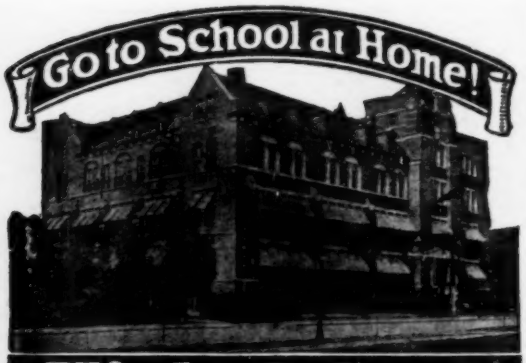

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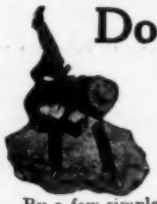

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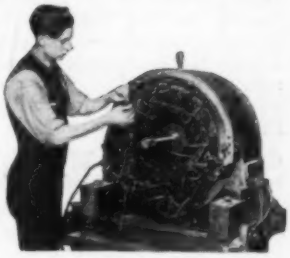

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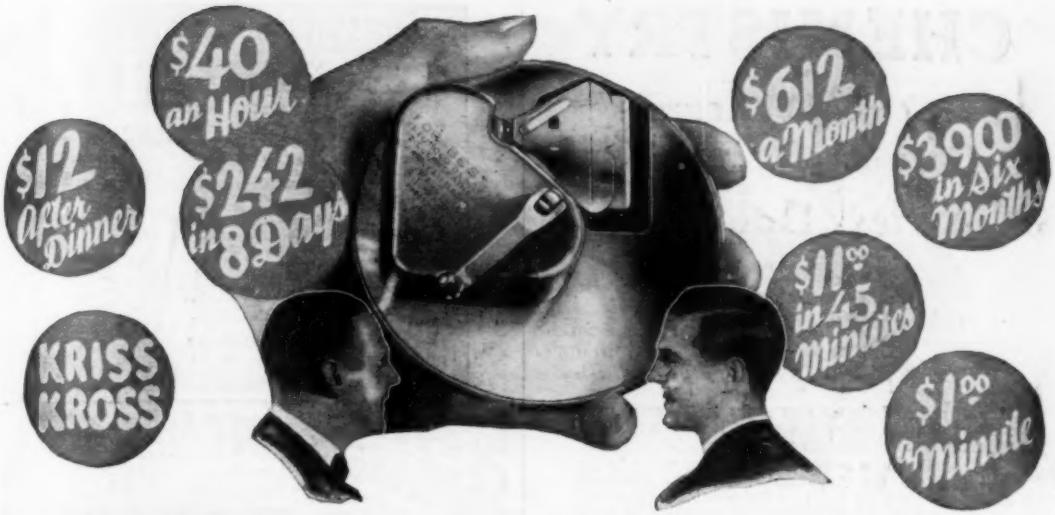

HOW I Discovered the Secret of Making $7500 a Year and More!

Here are Some Amazing Inside Facts About Success—As Discovered by a Man Who Has TRIPLED His Former Earnings in 3 Short Months! Read This Interesting Message Without Fail!

By N. C. Paige—Star Salesman After 3 Months' Experience

$104 in 3 days! $80 an hour! $7,500 to $10,000 a year!

Those are figures I was only dreaming about a few months ago. But today they are chalked up in black and white on my sales record, and, what is **more** important, in my bank book! And yet, to be frank, only a small part of the credit is due me. Anybody with average ability can do exactly the same.

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Take my own case for example. Before I "came to," I tried nine different ways of earning money. They all sounded good, solid, substantial and difficult. The harder they looked, the bigger I thought the possibilities must be. None of my propositions panned out and I hardly made enough to keep going. Then I discovered KRISS-KROSS.

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"Think of it! 365 keen, cool shaves a year from the same blade. That's what KRISS-KROSS is doing for American shavers everywhere!

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"KRISS-KROSS strops your blade (any make) on the diagonal just like a master barber. Pressure decreases automatically. Nickel jig flies up to notify you when your blade is ready.

"And now for my smashing offer! To introduce KRISS-KROSS stropper I will give you an amazing new kind of razor free. Really 3 razors in one. Can be made straight or T-shape in a jiffy. Comes with 5 special blades."

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"Agents: Make big money as a KRISS-KROSS representative—$75 to $225 a week. H. King made $66 in one day. J. C. Kellogg made $200 in 7 days."

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I saw my chance and grabbed it! The KRISS-KROSS people gave me exclusive territory, a wonderful lot of sales helps and a big, illustrated salesmanship course book that contained selling secrets worth $100 cold cash to me! My first week I made $180! The next 3 days I made $104. Just think of it! It didn't seem to take any effort. The orders rolled in like water over a waterfall!

Mr. Paige's experience is typical of that of hundreds of KRISS-KROSS representatives. Practically every man who takes up this astonishing proposition writes us that he is making money faster and easier than he ever dreamed possible. Right now more KRISS-KROSS representatives and agents are wanted—to earn $30 a day and up. Find out about it today! Clip the coupon and mail it at once! You'll never regret it. Paige didn't! So act at once!

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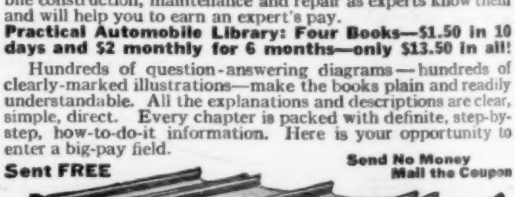

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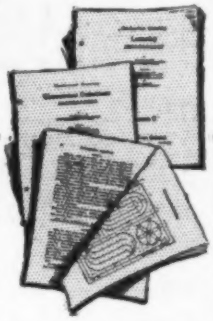

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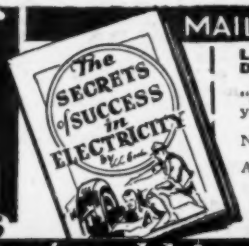

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FORMULAS AND TRADE SECRETS

ANALYSIS, $3.00. Practical Formulas, $1.00. Manufacturing ideas made practical, $5.00. With sample, $6.00. Associated Chemists, Indianapolis, Ind.

1,000,000 FORMULAS, valuable information, 1016 pages, $2.25. 500 Formulas Free if you order quick. Ideal Book Shop, Park Ridge, Ill.

TOMBSTONE Renewing: We will send amazing money getting process to 2 Men, Women or Boys to go partners working cemeteries; spare time or steady; lonesome work but dollars jingle. Sterling Specialty Co., 231 Federal, Denver, Colo.

TWELVE honest-to-goodness money making formulas $1.00. Dorhan Co., P. O. 17, Woodhaven, N. Y.

FORMULA for printing photos on neckwear $1.00. Gregg Novelty Co., 1540 East 65th Place, Chicago, Ill.

SUCCEED Making Your Own Products. Use our Formulas, Processes. All kinds. All lines. Catalog, special circulars free. B. Thaxly Co., Washington, D. C.

FORMULAS: Absolutely guaranteed. Best chemical science has devised. Don't risk your money till you've investigated these wonderful processes for all lines. Get my valuable "eye-opening" literature. Highest references. 30 years supplying the best. Miller, Chemist, 1706-P Jetton, Tampa, Fla.

10,000 FORMULAS. A real gold mine of money-making ideas. Tells how to make almost everything under the sun. You can make and sell cosmetics, mucilage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send no money. Just write a postal for "Henley's 20th Century Book of Formulas." Pay postman postage and $4. Popular Mechanics Press, Room 906, 200 E. Ontario St., Chicago, Ill.

15,000 FORMULAS in "Scientific American Cyclopedia of Formulas." Includes following and many others: Accidents and emergencies, agriculture, alloys and amalgams, artist's materials, beverages, cements, glues, pastes, mucilages, bleaching, renovating, coloring metals, dyeing, glass, heat treatment of metals, household formulas, ice cream, confectionery, chewing gum, lapidary work, exterminating vermin, lubricants, paints, varnishes, photography, condiments, canning formulas, rubber, soap, candles, soldering, toilet preparations, perfumes, waterproofing, fireproofing, writing materials. Send no money. Just write a postal. When postman hands you book pay $5.50 and postal charges. Popular Mechanics Press, Room 906, 200 E. Ontario St., Chicago, Ill.

500 FORMULAS including Luminous Paint—Renewing Dry Batteries—Resilvering Mirrors—Gas Tonic, Puncture Plugger, 25c. Catalog Free. Ideal Book Shop, Park Ridge, Ill.

20c—ANY Formula, 20c. "Hawkins," 215 Lasanimas, Colorado Springs, Colo.

TWENTY Money Making Methods. Write Bruce Hudson, Clarks Green, Pa.

AGENTS WANTED

I WANT a partner-agent to take care of my business in your town. I furnish everything, including world's finest line of 175 household products and I split the selling price with you 50-50. Beautiful sample outfit makes selling easy; food products; household necessities; things people eat; highest quality—lowest price—quick sales—permanent repeat business; $25,000.00 bond guarantees quality. I pay largest commissions—give Chrysler closed car besides. Get my amazing offer for your locality quick. Write or wire C. W. VanDeMark, Vice Pres. Health-O Products Co., 101F Health-O Bldg., 117 Duane St., Cincinnati, O.

SOFT Drinks in Powder—Orange, cherry, strawberry, etc. Makes best drink you ever tasted. Just add cold water and sugar. Reliable people wanted to place our drink powders in stores and appoint agents. Big profits to stores—you make 80c to $3.00 profit on each sale. Retails 10c package, makes 10 big glasses. Very attractive advertising matter—nearly everyone buys. Repeat sales sure. Also larger packages for those who sell by the glass. 85c clear profit on each dollar at 5c glass. Particulars free, or send 10c for 10 glass package; 50c for seven packages, all kinds (70 glasses), postpaid. Chas. E. Morrissey Company, 4417 Madison St., Chicago.

AGENTS—$13.80 Daily in advance. Introducing New Insured Hosiery for men, women, children. Must wear or replaced free. 57 styles, 39 colors, including latest "Silk to the Top" Ladies' Hose. Nyland made $595 in one month. Edwards, $460.60. Mrs. Bone, $425.45. Why not you? Even spare time should pay you $3.00 an hour. No experience needed. We furnish samples. Silk hose for your own use free. New Plan. No matter what you are now doing, write quick. Macochee Company, Road 2566, Cincinnati, Ohio.

EXPERIENCE Unnecessary, remarkable discovery removes drudgery from polishing table silver, auto trimmings, all metalware, furniture. Abolishes sticky pastes, messy liquids and powders. Startling demonstrations make sales self-closing. Low price; quick cash gain. Up to 233% profit. Test samples free. E. B. Lightning Corporation, 1773 Greenleaf Ave., Chicago, Ill.

AGENTS, Salesmen, Crewmen—You'll have the Devil's-own-time finding a better seller than "Zippo." Splendid profit on snappy 50c "Go-Getter" repeat article that sells on a ten-second demonstration. Works while you watch it! Demonstrates value while others waste time making claims. New development! Greatest scientific triumph of the age! It's the berries! Write immediately for complete proposition. Karam-Smith Company, 606 Bozan Street, Fort Wayne, Ind.

AGENTS make $40 to $80 weekly selling typewriters re-manufactured like new by the "Young Process." Lowest prices and easiest terms ever offered. Big commission—no investment—real opportunity to start in business for yourself. Write today. Young Typewriter Co., Dept. 7106, 654 W. Randolph St., Chicago, Ill.

100% PROFIT. Every home buys "The Home Patrol" Burglar Alarm. Automatically sounds alarm and locks window. Agents coining money. Particulars free. Tuerk Mfg. Co., 32 No. Jefferson St., Chicago.

JUST Out—Patented Apron. No strings or straps; on or off instantly; $20 a day easy; every demonstration a sale; over 100% profit; commissions daily; write today for free offer. Staput Co., Dept. 206, St. Louis, Mo.

MEN—Women—Earn $25 week during your spare time. Wonderful plan sells 9 out of 10. Experience unnecessary. W. C. Laboratories, 1223 Wabash, Chicago.

AGENTS, portraits, photo-pillow tops, frames, sheet pictures, medallions, photo-jewelry, guaranteed hose, laundry tablets, food products, toilet requisites, luminous crucifixes. Catalog 50 specialties free. 30 days' credit. Jas. C. Bailey, Dept. C-6, Chicago.

AGENTS—Can make $250 weekly following our proven successful selling plan. An article you will never want to change from selling. Strictly first class every respect; just exactly right price to make big worthwhile money selling; over 75,000 sold in Philadelphia. Real $250 weekly proposition appointing sub agents, agencies, individual sales. Fagley & Halpen, Desk 40, Philadelphia, Pa.

AGENTS—Best seller; Jem Rubber Repair for tires and tubes; supersedes vulcanization at a saving of over 800 per cent.; put it on cold, it vulcanizes itself in two minutes, and is guaranteed to last the life of the tire or tube; sells to every auto owner and accessory dealer. For particulars how to make big money and free sample, address Amazon Rubber Co., Philadelphia, Pa., Dept. 505.

SALESMEN—A live-selling Novelty—also suitable for advertising premium, priced under all competition. Guaranteed for life. $1.00 brings samples on our refund plan. Crawford, 2346 N. Clark St., Chicago, Ill.

$18 TO $25 daily. Biggest selling line of 2-piece suits, $9.95 and $12.50; 3-piece wool suit, $17.95 (regular $28.00 value), All-wool overcoat, $18.50. Splendid raincoats, slickers and boys' suits. Biggest commissions. Free outfit. "Jim" Foster, Inc., Dept. 90, 2250 S. Spaulding Ave., Chicago, Ill.

AGENTS Wanted for fast, easy seller—Marvel pipe cleaner; literature free. Costick Products, 400 West 23rd, New York.

AGENTS, Whirlie Gigs. Hot novelty for automobiles. Sample fifty cents. Service Oil Company, Sterling, Ill.

$40.00 SUITS for $23.50! All one price. Union made of finest quality Virgin Wool. You don't have to know anything about selling clothing. We guarantee your success if you are honest and willing to work. Write at once. William C. Bartlett, 850 Adams, Dept. 178, Chicago.

WOULD $100.00 Per Week Interest you? Millions of photos all over the country just crying to be made into beautiful, artistic medallions. We have new plan. Lowest prices. Speedy service. Experienced agents losing money every day they put off writing us. Art Medallion Co., Department 27, Corner Campbell and Jackson, Chicago, Ill.

THE Magic Bill Fold—A Wonderful Seller. Sample 25c. Elson's, 81 Heckman St., Phillipsburg, N. J.

AGENTS, $17.50 daily. Bonus besides. Auto furnished. Introduce finest hosiery. Seven months' guarantee. New selling plan gets business fast. No experience needed. Write for Samples. Betterknit Textile Co., Silk 231, Greenfield, Ohio.

YOU Can Make Good Durable Paint and Varnish 40c per gallon. Write Dept. 2, Emmelmann Bros. Mfg. Co., Indianapolis, Ind.

BUSINESS Guide with free legal service sells everywhere. Wells cleared $1,185 in 35 days. Write for free outfit. Nichols Co., Naperville, Ill., Box 6.

DON'T sell for others. Employ agents yourself. Make you own products. Toilet articles, household specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1976W Broad, Richmond, Va.

1 AUTO Gas Saver Free. To introduce. All makes. Amazing mileage increase. Critchlow, C5-805, Wheaton, Ill.

AGENTS—Sell car owners—Any make, new auto spring oiler. Increases riding comfort—tire mileage, prevents spring breakage. Attached instantly. Nothing like it. Large commissions. Protected territory. Write Dept. D, Liberty Auto Supply Co., Pomona, Calif.

DIFFERENT selling plan; low prices and quality gets the business. 100% profit. Over 100 fast selling brushes, dust mops and household necessities. State age and experience. Kautenberg Co., Box P, Freeport, Ill.

$25 DAILY showing $2.98 slickers. $1.25 gift to customer makes sales easy. Outfit free. American, 724P, Roosevelt, Chicago.

BE Independent. Make, Sell Your own specialties. Immense profits. Catalog dependable Formulas, special selected agents' best sellers, free. M. Lustro, 832 East Pershing, Chicago.

100 MORE active men to Introduce Chieftain Guaranteed Tailored Shirts, 3 for $4.95. Latest novelties, colors. Dickman, Illinois, in 3 weeks made $589; Sinton, Texas, in 12 days, $219.60; Bend, Iowa, in 16 days, $334.80. Why not you? No experience or capital needed. We deliver and collect. Full working outfit Free. Cincinnati Shirt Company, Lane 1586, Cincinnati, Ohio.

AGENTS: Amazing new invention. Self-wringing mop. Simply push button and it's wrung. Hands never touch water. 80,000 sold one city alone. $90 to $135 week easy. Write today for quick selling plan. Sample furnished. National Products Company, Plan 831, Dayton, Ohio.

AGENTS—$100 a week for full time; $25 to $50 spare time. Equipment and car free. Exclusive territory. Sound, permanent proposition. A rare opportunity, but you must act quickly. Write for particulars today sure. American Products Co., 9209 Monmouth, Cincinnati, O.

DISTRICT Managers—Agents: Capable men and women financially able to create and sustain branch office for new low-priced household necessity in big demand. Agents also wanted. For particulars write, Pittsburgh Sanatory Supply, Inc., Wilkensburg, Pa.

AGENTS, $260 month. Bonus besides. Introduce finest line guaranteed hosiery you ever saw. 126 styles, colors. New sales plan a wonder. No experience needed. No license to pay. Auto furnished. Credit given. Spare time satisfactory. Samples furnished. Wilknit Hosiery Co., Dept. 2431, Greenfield, Ohio.

AMAZING large cash commissions introducing beautiful $3.95 and $4.95 Fit-to-Measure Guaranteed Shoes. Actual samples furnished. Write for your territory. Style Arch Shoe Co., Dept. R-166, Cincinnati, Ohio.

YES you can make $5.00 to $15.00 daily selling our new adjustable waterproof aprons. B. & G. Rubber Co., Dept. 200, Pittsburgh, Pa.

TOMBSTONE Cleaning; lonesome work, but dollars jingle. See under classification (Formulas).

THANCO Vanilla—Bottle Yourself! Concentrated; add water! Free labels. Whirlwind seller! 500% profit! Crushes competition! Other Moneymakers. Write Thomas Manufacturing Company, Indianapolis, Ind.

POSITIVELY the finest embossed show cards. Brilliant imported metallic letters. Greater variety of colors. Two sizes. Quick sales, big profits. Repeats. Embossed Show Card Co., 9474 Euclid Ave., Cleveland, O.

NOTHING Sells Like Shoes. Every person a prospect. Take orders for Mason Shoes direct from factory. 85 stunning styles. Amazingly low prices. No experience needed. Free outfit. Mason Shoe Mfg. Co., Dept. 17-B, Chippewa Falls, Wis.

NEW Cigar and Cigarette Lighter sells for $1.00. Does work of $20.00 lighters. Your profit 100% in advance. Every lighter guaranteed 10 years. Amazing profit maker. Sale a minute. New Plan. Write for sample offer and details. Masterlite Company, Desk 600, 110 East 23 Street, New York City.

SPORT Sun Caps, Sun and Auto Goggles, Needle Packages, Snappy Comic Postcards, Bathing Girls, etc. Samples 10c each. Klees Co., 1710 Undercliff Ave., New York.

DISTRIBUTORS Wanted—"1927 Pruitt-Sheridan Directory" (where to buy half million articles wholesale). Pruitt System, Brookfield, Ill.

MONOGRAM Automobiles, $1.35 Profit ten minutes' work; every owner wants them; millions without; particulars free. Motorists Accessories Co., Mansfield, Ohio.

NEW Dynamo Timer guaranteed life of car. 12,000,000 prospects. Earn $100 weekly. Write today. Free sample. Dynamo Co., 426-1108 Eleventh St., Milwaukee, Wis.

MAKE $100 weekly supplying demand for new invention. Makes autos run on 7% gasoline. Free sample. Write Whirlwind Co., 1041-357 Winnebago, Milwaukee, Wis.

SIMPLEX Vaporizer. 25 to 60% increased mileage guaranteed. Retails $1. Thirty Days Free trial. Exclusive territory. American Fixture Co., 234 West Water, Milwaukee, Wis.

FLORAL Mirror, 35c. Send birth date. Jabe Studio, Kansas City, Mo.

AGENTS: Build a permanently profitable business on one easily sold item. Globe Re-Atomizers, a new, patented invention has an untouched, ten-million-dollar market awaiting it. Act now and obtain exclusive representation. Send $1.00 for sample and complete information. References: Chamber of Commerce, R. G. Dun, National City Bank, Brotherhood Bank. Globe Sales & Distributing Co., 101B Spokane St., Seattle, Wash.

HOSIERY Free and $12 daily. Sell nationally known Pure Silk Hosiery. Amazing values. Experience unnecessary. Free sample outfit mailed immediately. Pure Silk Hosiery Co., 208 W. Monroe, Dept. P90, Chicago.

AGENTS: Men-Women, big money selling new wonderful silver polish—jewelry cleaner. Easily demonstrated. Repeats! Protected territory. 100% profit. Whole—spare time. Cynox, 1 West 34th, New York, Dept. C.

$100 WEEKLY representing large Direct to Wearer Company; Complete Shirt, Necktie and work clothes line. Unbeatable combination means selling everyone. Advanced commission and bonus. Sales Compelling outfit Free. Howard Shirts, 1213 Van Buren, Dept. M40, Chicago.

WOMEN—$2 an hour spare time; 100% commission, new idea sanitary necessity; sells on sight; every woman buys; new feature never before used; designed by physician; revolutionizes old uncomfortable methods; pay every day; no deliveries, no collections, no experience or capital required. Particulars mailed in plain envelope. Write Mrs. Mary P. Coleman, Meriden, Conn.

EASY money wearing free shirts. Be my local distributor. Greatest values ever offered. Big Profits. Fashion Wear Shirt Co., Dept. G-942, 1220 Jackson St., Cincinnati, Ohio.

FREE Outfit—$10-$15 daily. Guaranteed all-wool tailored trousers less than store prices. Quick sales. Big money. Pay daily. Free trousers offer. Hutchins Pants Co., Dept. 160-FC, Cincinnati, Ohio.

AGENTS, Either Sex: Biggest 50-cent proposition on earth. Every firm and home a buyer. Sells itself. Send 50 cents for sample and full particulars. Earl Ramsey, Firth, Idaho.

DON'T sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1970W Broad, Richmond, Va.

1 AUTO Gas Saver Free. To introduce. All makes. Amazing mileage increase. Critchlow, C4-805, Wheaton, Ill.

NO Dull Times Selling Food. People must eat. Federal distributors make big money; $3,000 yearly and up. No capital or experience needed; guaranteed sales; unsold goods may be returned. We furnish you with sample case, license and Free Samples for customers—Sure repeat orders. Exclusive territory. Ask now! Federal Pure Food Co., A2307 Archer, Chicago.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

GOLD Sign Letters. $9.75 for Thousand. Non-Tarnishable. Free sample. Catalogue. Atlas Sign Works, 1032 E. 55th St., Chicago.

AUTO owner tire agent wanted each locality to use and take orders for handmade Mellinger cord and balloon tires; guarantee bond 15,000 miles; shipped prepaid on approval; get your tires free; no capital or experience required; make $100 to $300 weekly. Write for wholesale prices and sample kit. Address Mellinger Tire Co., Dept. 400, Kansas City, Mo., or Dept. 400, Philadelphia, Pa., or Dept. 400, Oakland, Calif.

MEMBERS of Masonic Fraternity, Knights of Columbus, Shrine lodges, Knights of Pythias, sell new hand-laced $7.00 bill folds for $3.50. Sent on approval. 10% discount allowed. The Fraternal Leather Goods Co., P. O. Box 1030, New Haven, Conn.

$10 TO $15 a day easily made. A whirlwind seller. Sample and particulars 10 cents (silver). Excello Sales Co., Shreveport, La.

AGENTS—Men, women, big profits selling Veripure Vegetable Soap. Wonderful new soap for toilet, bath, etc. Write today. Veripure Laboratories, Box 999-C, Chicago.

AGENTS: Salesmen—Sell New Thermostatic Automatic Carburetor Control Attachment for Fords. Big profit, full or part time. Increases mileage 50-100%. Attached in two minutes. No drilling. Cadillac now using Thermostatic Carburetor Control under Blancke license. Sales guaranteed. $15.00 a day Guaranteed to Distributors. Write today. Blancke Auto Device Co., Dept. 805-H-X, 157 E. Erie St., Chicago.

SELL slickers, Plaid-lined $2.65, value $10.00. Pay daily. Bonus weekly. $1.50 free premium. Silvertone, 2035AA, Charleston, Chicago.

WILL you wear a pair of genuine tailor-made shoes at my expense? Will you show them to your friends and take their orders? I will Also send you Free our big selling Outfit showing 70 shoe styles and 60 actual leather samples. I pay my agents $8.00 daily. Write quick. Tailor-Made Shoe System, 932 Wrightwood, Dept. 294, Chicago.

NEW Invention—400% profit. Liquid Quick mend for Hosiery and Fabrics. Stops Runs. Every woman buys. Hundred other fast sellers. J. E. Johnson Co., Dept 434, 6145 Wentworth Ave., Chicago.

WE Pay $50 A Week And Expenses and give Ford Auto to men to introduce poultry and stock compounds. Imperial Co., D23, Parsons, Kan.

EVERY Autoist buys Auto Mitten Dusters. Costs 25c, sells for 75c. Sample given. National Fibre Broom Co., St. Louis, Mo.

AGENTS: Make $500.00 monthly. Pay daily. No investment. Rhinestone initial buckles and novelties. Sell easy everywhere. Exclusive territory. Chaton Novelty Co. 606 Blue Island, Chicago.

AGENTS, make $3.00 an hour taking orders for our 40 fascinating Kitchen Specialties. No competition. Write quick. General Products Co., Dept. 7-K, Newark, N. J.

$10.00 SLICKERS only $2.98. Biggest commissions. Represent manufacturer. 10 colors. Free outfit. Roseville Manufacturers, 713 Roosevelt Road, Dept. H-3, Chicago.

AMAZING 30-day Offer! To prove our Mexican Blu-Flash Gem really matches finest genuine Diamond Side-by-side, we'll mail perfect $5.00 picked sample, alive with rainbow fire, for only $1, with catalog, proof of our claims, and Free $5 Jewel case proposition. Sells at sight; enormous profits! Write quick. Mexican Gem Co., Box P-56, Monterey, Calif.

MIRRORS Resilvered at Home. Costs less 5 cents per square foot; you charge 75 cents. Immense profits plating auto-parts, reflectors, tableware, stoves, refinishing metalware, etc. Outfits furnished. Details Free. Write Sprinkle, Plater, 128, Marion, Ind.

PORTRAIT Men, largest frame Portrait House on coast. Foreign shipments our specialty—twenty-hour service. Victor Portrait Co., 2223 Brush, Oakland, Calif.

EARN $80.00 weekly with Paris Fashion Frocks for women. Factory prices. Advance commissions. No experience necessary. New plan! Fashion Frocks, Dept. D-100, Cincinnati, Ohio.

WHY not sell us your spare time? $2.00 an hour, $19.70 Daily Easy Full Time. Introduce 12 months Guaranteed Hosiery—57 styles, 40 colors for Men, Women, Children, including latest "Silk to the Top" Ladies' Hose. No capital or experience needed. We furnish samples. Silk hose for your own use Free. New Plan. M. H. Mathews, Road 5866, Cincinnati, Ohio.

FOODS always sell. 100% profit. Big repeaters, new sales plan. Write for territory. Mother Hubbard, 553 Congress, Chicago.

ALTA Snubbing Shock Absorbers. Agents wanted. Six dollars cash. Retailing sixteen. Big money maker. Results satisfactory. Alta Shock Absorber, 900 O'Farrell, San Francisco, Calif.

THANCO Vanilla—Bottle Yourself. Concentrated; add water! Free labels. Whirlwind seller! 500% profit! Crushes competition! Other Moneymakers. Write Thomas Manufacturing Company, Indianapolis, Ind.

GET exclusive territorial sales right for Becklin Quick Adjustable Close Quarter Pipe Wrench. Make substantial percentage on sales; build permanent business for yourself. Becklin Wrench Company, Seattle, Wash.

AGENTS or Live-Wire Salesmen, sell invention rights to people, home manufacturing, a new novelty. Tools Furnished. Write, Max H. Feist, Toutle, Wash.

NEW, Fast Seller; 150% profit; "Bestever Powdered Hand Soap"; removes grease, paint, ink, dirt; great repeater. Sample Free. Bestever Prod. Co., 4319-P, Irving Park, Chicago.

GET 50 cents from every auto owner you meet. Amazing new product. Sed-Ex poured in radiator cleans cooling system of three to five pounds rust and sediment. Ends overheating, adds power. Guaranteed harmless. Every motorist buys, also garages. Good for $10 to $20 daily. Walker & Walker, 81 E. Madison, Chicago.

SUCCEED Making Your Own Products. Use our Formulas, Processes. All kinds. All lines. Catalog, special circulars free. B. Thaxly Co., Washington, D. C.

PORTRAIT Agents—Write for new Catalogue—Enlargements, Frames, Medallions, Sheet Pictures, Luminous Crucifixes. Adam J. Kroll & Co., 2539 So. State St., Chicago, Ill.

NEW Wonderful Seller, $1.40 profit on every $1.50 sale, monogramming autos. Free samples. Monogram Co., Desk 11, Worcester, Mass.

FIBRE Brooms—detachable handles, fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

AGENTS—Make a dollar an hour. Sell new kind of sharpeners. Sharpens all knives and tools quickly. Demonstrating sample free. Premier Mfg. Company, Dept. 68, Detroit, Mich.

$50,000. PICTURE Man Friedman made canvassing. Beginners can make $100.00 weekly with my sales talk. Experienced men make more. Free book. "Profits in Portraits" explains. Samples Free. Picture Man Friedman, Dept. 8-H, 541 W. Lake, Chicago.

A PAYING Position Open to representative of character. Take orders—shoes, hosiery direct to wearer. Good income. Permanent. Write now. Tanners Shoe Mfg. Co., 5-90 C St., Boston, Mass.

$61.50 WEEKLY, Introducing and selling a new gas-light burner for kerosene lamps. Beautiful light. No chimney. No mantle. Samples free. Luther Manufacturing Company, Dept. 596, Cincinnati, Ohio.

AGENTS clean up. Sell automobile flagsets for decoration day. Write Unger, 571 Harrison, Chicago.

AGENTS Make 200% Profit Direct Sales; 100% selling retailers, 50% selling jobbers Regular and Pleasant medicated gums. Fast sellers; permanent repeats. Exclusive territory to producers. Pleasant Products, 134-P Mt. Pleasant, Newark, N. J.

MAKE Fifteen Dollars per day. New Grass Shear—sells on sight—season just starting. Amazing profits for you. Alliance Toy & Specialty Co., Alliance, Ohio.

DOUBLE Your Income. Read Opportunity, the Magazine that offers thousands of openings to double your income. Sent Free. Just send name and address. Opportunity Magazine, 750 N. Michigan, Dept. C-2, Chicago.

AGENTS, $240 month. Complete line auto specialties. 100% profit on every article. Territory given. Write quick for particulars. American Accessories Co., Plan 231, Cincinnati, Ohio.

72 SALES in Four Hours. Profit $64.80 (Sworn Proof). That's the record of "Doc" Barber. Every woman buys on 10-second demonstration. Profit up to 150%. We want 500 ambitious men and women. Exclusive protected territory. New self-wringing mop that really wrings dry, without wetting hands. No gears, bolts, or screws. Weighs only 2 pounds. Simple, Practical, Perfect. Lasts a lifetime. Territory going fast! Write quick! Delphos Mop Co., A101 Tenth St., Delphos, Ohio.

AGENTS—Make $100 weekly selling Gray Seal—automatically, instantly, and permanently seals all tire punctures. Demonstration closes a sale every time. Exclusive territory assigned. Brass pressure-gun given Free with sample can for $1 (enough for any tire). Money-back guarantee. Gray Seal Products Corp., 200 Rutger St., St. Louis, Mo.

75c PROFIT on $1.00 sale. Auto, furniture and glass cleaner. Your name on label. Exclusive rights; free sample. Mfg. E. 213 Griswold, Detroit, Mich.

STARTLING New Invention for the lawn. Medicine bottle for the lawn and garden. Turns water to medicine for the lawn, yet uses only water. Attach it to a hose, turn on the water, and watch the crowds gather to see what's going on; makes water roll up like a smoke bank. Gets 'em all. Takes the place of sprinkler; everybody buys. Sells for only $2.00. Agents make half and more. Selling by the thousands. Nothing like it. To save delay, send one dollar for agents' sample. Write for our proposition. Lawn Invention Company, La Crosse, Wisc.

CASH Paid for Butterflies, Insects. See Sinclair Display Advertisement on page 32.

WANT Producing Agents and salesmen? See advertisement under Advertising Agencies, page 49. Frank W. Lemhoff Advertising Agency, Chicago.

IT'S the cat's meow. Brand new novelty. Biggest seller on earth. Write today for particulars. Noveltics, Box 10, Mt. Washington, Ohio.

JUST Landed. New, imported double-edged safety-razor blades. Retails 50 cents dozen. Big seller and money maker. Write. Suburban, Mt. Washington, Ohio.

BIG Money easily made without peddling or outfits. Free particulars. Elite, 38 Elizabeth St., New York.

BIG Money Monogramming Automobiles. $1.40 Profit on $1.50 Sale. Particulars and samples free. Evans Products Company, Midian Avenue, Windsor, Conn.

$100.00 WEEKLY selling Tooth Whitener Display Cards to stores. Fast repeats. Exclusive territory. Wonder plan assures permanent income. Write quick. Terrell Products Company, Martins Ferry, Ohio.

AGENTS: It's a winner. Combined cigarette and match case. Black grain finish leatherette. Holds package cigarettes and box matches. Sells on sight. Big profits. Write for details. All-In-One, Dept. A-6, 2810 Portland Ave., Minneapolis, Minn.

"MAKE and Sell Your Own Goods"—Guaranteed formulas. All kinds. Catalog free. Clover Laboratories, Park Ridge, Ill.

SALESMEN—Are You Making Enough Money? Let us show you how to make Big Profits with Jiffy Washing Tablets. No experience required. Write for Free Sample and Plans. Jiffy Soap Products Co., Dept. A, Dayton, Ohio.

300% PROFIT: Whirlwind selling household, store, office necessity. Fast repeater. Free sample. Magic Products, Room 200, 332 East 31st, Kansas City, Mo.

NEWEST European Novelty Just Out. One article has four uses. Sells less than dollar. Over 100% Profit. Write T. Kobayashi Co., 208 N. Wabash., Chicago.

SELL Surety, the Original, Genuine, Powdered Hand Soap, and make $5,000 yearly. We furnish sales plans, advertising and free samples. Write quick. Surety Mfg. Co., Dept. 56, 26 W. Washington St., Chicago.

SELLING Like Blazes! Eleven piece toilet goods assortment at $2.25 with two piece carving set free to your customers. 100% profit. Davis Products Co., Dept. 56, 1321 Carroll, Chicago.

OUR Agents average better than $75 a week; Rich's pure fruit soft drink powders. Every home, store, drink dealer buys. Sample Free. Sol P. Rich Co., 622 S. Sangamon, Chicago.

WHY work for small pay? Make $10 to $20 day selling Re Nu Edge Knives—new magic knife that does away with Dull Knives. Barnett Mfg. Co., B3 418 San Pedro, Los Angeles, Calif.

AGENTS: We have a whirlwind seller. Get details. Webster, 608 Wrightwood, Chicago, Ill.

FREE "Manufacturer's Bulletin" tells about salable new products you can make and sell. Gives reliable commercial information. Manufacturer's Bureau, B38 1129 East 31st, Kansas City, Mo.

$35 PROFIT on $1.50 outfit. Gold transfer monogram; free sample. National Station D, Brooklyn, N. Y.

SELL Electric Fixtures to every home owner, complete line, easy sales, no investment, beautiful catalog, big commissions. National Illuminating Company, 1123 Broadway, New York City.

MAN with auto; one day weekly; $35. Bens, Woodside, N. Y.

MAKE $10 a day without selling. New plan. We send customers to you for greatest gas saver. Cuts gas bills 25%, guaranteed. Gives motor more pep and power. Removes carbon. Positively no cold turkey work. We have perfected a plan that sends you buyers as fast as you can handle them. Big money, easy. Write today for complete plan. Mac Auto Products Company, Dept. 506, 6355 Broadway, Chicago.

SELL America's Quality all brass Spark Plug; sample outfit Free; openings for state and county distributors; excellent profits; product guaranteed; write "ASKO," Canton, Ill.

ARE You Old at Forty? See our advertisement on page 74 of this issue. The Electro Thermal Company, 2169 Main St., Steubenville, Ohio.

DON'T sell for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1970W Broad, Richmond, Va.

HUNDREDS of manufacturers, formerly agents selling other goods now owe their success to Miller's Guaranteed Formulas for making biggest-selling, advertised specialties in all lines. Investment small. No machinery needed. Profits great. Make your own goods—get the profit you're entitled to. Write today for my "eye-opening" literature. It's free and tells all. Miller, Chemist, 1706-W Jetton, Tampa, Fla.

AGENTS—To Sell the New Featherweight All Purpose Waterproof Coat. Weight only 26 ounces, latest styles and colors. Men's $4.98, Women's $3.98. Liberal commissions. Write today for sales plan. Featherweight Coat Company, 5719 Euclid Ave., Cleveland, Ohio.

AGENTS—Radio product; unlimited possibilities! Write. Kimley Electric Co., 2663 Main St., Buffalo, N. Y.

$16 A DAY Easy—I start you in auto accessory business; no investment; no experience necessary. Landin, 3433 Montrose Ave., Chicago.

GENUINE Gold Leaf Letters anyone can put on Store windows. Guaranteed to never tarnish. Large Profits. Enormous Demand. Free Samples. Write today. Metallic Letter Co., 438-D North Clark, Chicago.

GOLD-LEAF Sign Letters; make and sell; 1,000% profit. Johnston Co., Quincy, Ill.

AT Last! Diamond Rival Discovered! Amazing blue white Rajah Gem astounds jewelry world and deceives experts. Beautiful sample case free! $100 weekly. Quick! Rajah Diamond Co., Dept. F20, Salisbury, N. C.

$31.00 PROFIT—with $1.50 Outfit—Big Money—Easy Work. Selling Gold Monograms for Automobiles, Luggage, Windows, Wagons. No Experience. No License. "Samples Free." NuLife Monograms, Hartford, Conn.

OUR New Household Device washes and dries windows, sweeps, cleans walls, scrubs, mops. Complete outfit costs less than brooms. Over half profit. Harper Brush Works, 132 3rd St., Fairfield, Iowa.

REAL Whirlwind Seller—Nopulout Custom Shirt. Every man buys them. Patented—no competition. Liberal commission. Free selling kit. Make $15 up daily taking orders direct from consumer at manufacturer's prices. District or local agents. Write Nopulout Shirt Co., Dept. Y, Hazleton, Pa.

SELL absolute necessities. Cost 2c, sells 25c. Prices lowest. Seven different samples 30c. Catalog Free. Mills Sales Co., 13 East 16th St., New York.

SELL men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

DO you want good live agents—fellows who can get the business? Ask me how others are doing it. I'll gladly render the necessary assistance without cost to you. Address, M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

NOVELTY bedspreads. Silk and cotton fabrics. Guaranteed. Reasonably priced. Every housewife wants one. Liberal territory and commission. Write Rainbow Novelty Mills, Grover, N. C.

WE Start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 2480, St. Louis.

$75 WEEKLY. Man or Woman Wanted with ambition and industry to distribute Rawleigh's Household Products to steady users. Fine openings near you. We train and help you so you can make up to $100 a week or more. No experience necessary. Pleasant, profitable, dignified work. Write today. W. T. Rawleigh Co., Dept. IL8253, Freeport, Ill.

WANT Distributing Agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free. Solar Products Co., J-2142 S. Troy, Chicago.

ALL-YEAR-ROUND profitable business selling wonderful new water softener and cleaner. Removes grease, oil, ink and dirt quickly. Every home and business place a live prospect. 100% profit. Big repeat orders. Exclusive territory. Write for free sample. Seacoast Laboratories, Sea Bright, N. J.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-U West VanBuren, Chicago.

AGENTS: both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

SEND name, address on postcard. Free introductory copy Salesology Magazine; contains 1,000 money-making opportunities. Offered by big reliable firms; no obligations. Salesology Magazine, Desk B-38, 500 No. Dearborn, Chicago.

32 SECONDS complete tire change by Detmer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared $100. Anderson, Mont., sold 1400 in 14 weeks. Get details for good territory. Harvest time Now. M. Morey Rim Tool, Buffalo, N. Y.

SOMETHING New. Every motorist a buyer of our electro-magnetic-emergency Wonderlamp; takes only one minute to demonstrate and make a sale; no experience necessary; $5.00 an hour easily made, full time or evenings. Write for sample. Wonderlamp Co., 926 Fisk Bldg., Dept. 10-A, New York.

SELL—Farm necessity for repairing sagging fences. Write Hawbaker Co., Elmore, Minn.

AGENTS and District Managers: 250% profit selling exclusive, new process Artistic Signs. Hundreds of titles for every business. No competition. Write for details. Artistic Signs, 799R Broadway, New York.

WILLIAMS' Powdered Hand Soap has taken auto owners by storm. Cleans dirtiest hands instantly. Easy demonstration sells on sight. Free Sample and particulars. W. B. Williams, Inc., Dept. 266, Montclair, N. J.

1 AUTO Gas Saver Free. To introduce. All makes. Amazing mileage increase. Critchlow, C6-805, Wheaton, Ill.

AGENTS—Mosco Corn and Callous Remover will build you a steady repeat business. Send today for pocket size trial outfit. The Moss Co., 357 Searle Bldg., Rochester, N. Y.

EVERYBODY uses toilet preparations. Sell dainty, exquisite, delicately scented, Duo compacts, perfumes, powders, creams and lotions, Flavoring extracts and Specialties. Duo Co., TP-1, Attica, N. Y.

RADA-DIAMOND rivals the genuine diamond. Rich or poor buy them. Low price, fast sales, big profits. $10,000 yearly for hustlers. Pocket case free. National Co., Box 1174-PM, Omaha, Nebr.

AGENTS, Get our prices on Coffee, Tea, Desserts, Soaps, Perfumes, etc. Endless variety, superb quality, quick service. Sample display free. Address Blair Laboratories, Lynchburg, Va.

AGENTS: 500% profit. "Happy Home Make Shampoo" builds your own big business. Martin of Indiana made $75.00 in one day. Missouri man made $750.00 one month. Exclusive territory. Geo. A. Schmidt & Co., Dept. P, 236 W. North Ave., Chicago.

PHOTO Medallion Men and Women, the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers, Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

SELL "Fixit" Rubber Repair. Big pay. Doubles mileage of tires and tubes. Self-vulcanization without heat or tools. Big season now. Marquette, Z 2325 Wolfram, Chicago.

DON'T sell for others. Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1970W Broad, Richmond, Va.

THE best tooth-paste for Pyorrhea is Zi-O-Dine. Every tube guaranteed. Taste and cleansing qualities wonderful. Fifty cent tubes. Agents wanted. Iodine Products Co., Laurel, Miss.

AGENTS: Our gold-eyed Needle Cases are wonderful sellers; immense profits; $50 to $300 weekly; proof and particulars free; sample outfit 10c; factory prices. Paty Needle Co., 231 Davis Square, Somerville, Mass.

CALIFORNIA perfumed beads selling like hot cakes. Agents coining money. Big profits. Catalog free. Mission Factory P, 2328 W. Pico, Los Angeles, Calif.

OUR Luminous Crucifix Shines in the Dark. Every one amazed at the wonderful effect. Easily demonstrated. Easily sold. W. G. Hannan Co., Dept. B, 2539 So. State St., Chicago.

DIRECT Factory representatives for changeable letter window display signs. Good income assured. Experience unnecessary. Maze Manufacturing Co., Norwood Station, Chicago.

A BUSINESS of Your Own — Making Sparkling Glass Name and Number Plates, Checkerboards, Signs. Big Book and Sample Free. E. Palmer, 512 Wooster, Ohio.

AGENTS—New Plan, makes it easy to earn $50.00 to $100.00 weekly, selling shirts direct to wearer. No capital or experience needed. Represent a real manufacturer. Write now for Free Samples. Madison Company, 566 Broadway, New York.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

POLMET—The Wonderful Polishing Cloth that cleans all metals without liquid, paste or powder. Approved by "Good Housekeeping" and "Modern Priscilla"—sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

MAN in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

REPLATE brassy worn-off Automobile parts, Reflectors, Bath Room Fixtures, Worn Spoons, Forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. $1.00 half pints. Post Paid. Satisfaction Guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

AGENTS — Stamping names on Pocket Key Protectors; sample Check with your name and address, 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

ONE of the biggest mails on earth. Sent to any address for 10c. Louisiana Distributing Service, Dept. PM, Harmon, La.

AGENTS—Build permanent business with our gold sign letters. Easy work. Big profits. Samples free. Acme Sign Letter Co., 312 Dunn St., Sta. R, Cincinnati.

NO difference what you're selling, you can increase your sales 500% by giving our $1000 policies as free premiums. Costs you nothing. Write National, 715-M Baltimore Bldg., Chicago.

PATENTS. Time counts in applying for patents. Don't risk delay in protecting your ideas. Send sketch or model for instruction or write for free book "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from Patent Office), Washington, D. C. See pages 140 and 141.

NEW Camera. Regular black and white photos finished quickly inside camera. Make money selling cameras, taking photos or doing both. Crown Company, Dept. 481, Norwalk, Conn.

"LIQUID-LEATHER" Fills Holes in Shoes, Rubbers, Tires. Dries Instantly. Pliable, Waterproof. Just Imported from France. Tube Retails 75c—Cost 35c. Sells Housewives, Sub-Agents. Nulife Leather, Hartford, Conn.

REMNANT Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

AGENTS — Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marui Company, Tribune Bldg., New York, N. Y.

EARN $10 daily silvering mirrors, plating and refinishing metalware, autos, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

AGENTS—Send for Free Sample "Fretnot" Washday Wonder. Big Profit. You don't have to talk; if she doesn't buy at sight, leave sample. Exclusive territory. Credit given. Empire Specialties Co., 1549 N. Wells, Dept. 101, Chicago.

AGENTS make $100 week placing advertising Cigar Lighters with glass front. Every dealer wants one. Write for free plan. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

BIG Profits. Sell "No-Splash" 4-Strainer Water Filters. Fast sales, lowest prices; send for 6 dozen, $1.80 postpaid. Jones Mfg. Co., 243E2 Franklin St., Boston, Mass.

FREE Sample. "Rain Shield Wiper," Retails $1.00—Cost (25 cents). Sold Clear and Rainy Days. No Cloth—No Paste—No Attachment. (1) Rub keeps windshield clear 48 hours. Experience Unnecessary. NuLife Corporation, Hartford, Conn.

$50.00 WEEKLY easy. Applying Gold Initials on Automobiles. No experience needed. $1.45 profit every $1.50 job. Free Samples. "Ralco Monograms," 1043 Washington, Boston, Mass.

OVER 100% Profit. Self Lighting Gas and Cigar Lighters; Everybody interested, repeat business. Sell individuals, dealers, subagents. Particulars Free. P. Bernhardt, 127 West 30th St., New York.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—200% profit—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 230 W. Superior, Chicago.

HAIR Tonic—Concentrated. Add water and bottle. Labels free. Outfit for 36 dollar bottles, postpaid $1.00. Casey, 1043 Washington, Boston, Mass.

AGENTS—Mac's liniment (liquid mustard plaster) for coughs, rheumatism; Mac's Black Lotion for pyorrhea, wounds, sore gums, piles. Mac Chemical Corp., 74-A West St., New York.

EVERY Woman Wants a Sewing Set. Home Sewing Sets contain 142 useful sewing articles. $4 an hour easily made with this 50c seller. Prentice-Lee, 145 East 23rd St., New York.

BIG Profits: Steady Income our line food products, toilet articles, soaps. No cash or experience needed. Sample case free. Write Linro Co., Dept. 242, St. Louis, Mo.

HIGH-GRADE SALESMEN WANTED

WANTED—Tailoring Salesmen, make $60 to $125 per week. We are the largest made-to-measure tailoring house in the country, furnishing elaborate sample equipment. Over 150 all wool fabrics sell at $23.50, $29.50, $34.50 and $43.50 which includes commissions of $3.50 to $8.50 and bonus. Guaranteed absolute satisfaction, perfect fit, best workmanship, or no sale. We maintain an absolute 6-day delivery schedule. Write for our line and all accessories to be sent free. Tell us all about yourself. Edward E. Strauss & Co., Inc., Dept. 101, 402 So. Market St., Chicago.

TRAVELING Salesmen Calling on Retail Stores wanted by large manufacturer of fast-selling specialties entirely different from the average. Year-round sales, main or sideline. Big commission paid immediately on original and repeat business. Opportunity for well paid and permanent connection with old-established firm. If not making $150 weekly, write today. Union Specialty Works, Dept. 222, Boonville, N. Y.

$10,000 YEARLY Easy. No Experience Necessary. Selling Fast Seller Royal Special Policy which Pays $5,000 Accidental Death, $1250 Death from Any Cause; $25 Sick Weekly Benefits, $50 Weekly Accidental Disability—$24 yearly—Other Amounts Proportionate. No Medical Examination. Greatest Bargain. $5,000 Accident Policies given free to first 500 answering this ad. Mr. Minnec, American Peoples Life, 1107-159 North State St., Chicago.

WANT Producing salesmen and agents? See advertisement under Advertising Agencies, page 49. Frank W. Lenhoff Advertising Agency, Chicago.

PAVED Road Maps—Handy, inexpensive for advertising and premiums. Sell on sight. Full or sideline. Proposition, samples on request. George F. Cram Company, Indianapolis.

GOLD Leaf window letters and script signs. No experience; 500% profit. Samples free. Consolidated, 69-V West Van Buren, Chicago.

SPECIALTY Salesman qualified for position making $1,000 monthly. New electric sign. Extends 4 feet over sidewalk. Illuminated letters and border. Selling on sight at $25. Big commission. Flashtric, 2126 Hudson, Dept. P-2, Chicago.

BIG Season Just Ahead. Advertising pencils more popular every day—every business prospect. Our line repeats. Big commissions. Established 1902. North American Pencil Works, 126 So. Clinton, Dept. 129AB, Chicago.

SALESMEN—Get free outfit and make $90 a week taking orders for famous Taylor rain-proof, made-to-measure caps and knickers for men. Also eight other big profit-makers. Commission in advance. We deliver. Taylor Cap Manufacturers, Desk U-2, Cincinnati, Ohio.

$75.00 WEEKLY to Introduce "Chieftain" 3 for $4.95 Guaranteed Tailored Shirts. Full working outfit Free. Your own Shirts Free. Cincinnati Shirt Company, Lane 2946, Cincinnati, Ohio.

IF you want to get into a real money-making business, and help others at the same time, sell Radiumized Health Products. A world-wide unlimited field now open to producers. Exclusive territory. Write Radiumized Applicator Co., 1303-F Fillmore, Buffalo, N. Y.

SELL Paint. Easy to sell Paint, Varnishes, Roofing, Motor Oils, on 60 days' credit. We pay freight. Big commission. Money advanced. We deliver and collect. Write today for Free Sample Outfit. Loverin & Browne, F1647 So. State, Chicago.

IF You Think In Terms Of $6,000 This Year, write us now. Strong line for retail stores. Nationally advertised. Established concern. Best season now starting. Liberal weekly advance to producer. Continental Co., 2010 Euclid, Dept. 1300, Cleveland, Ohio.

EARN $20 a Day. Established income for life selling for $1 a year $1,500 accident policy. Write W. C. Stone, A-11 So. LaSalle, Chicago.

SELL Printing—Business and Personal stationery. 40% commission. Large line; big repeater. Samples free. Roberts Printing Co., 515-I Broadway, Albany, N. Y.

MEN—Sell dependable shrubbery, fruit trees, etc. Steady demand. Complete cooperation. Commissions paid weekly. We deliver and collect. Write Perry Nurseries, Dept. R-6, Rochester, N. Y.

$60-$200 A WEEK. Genuine Gold Letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

FOUR $7.50 sales to merchants net you $20.00 daily. Sayers Systems, 2803 Sheffield Ave., Chicago, Ill.

ANY Salesmen Can Sell Them! Merchants everywhere use punchboards. Someone sells them, why not you? Collect big commissions daily. Newest, largest, elaborate catalog sent upon request. Lincoln Sales Co., 9 So. Clinton, Chicago, Dept. D.

BECOME Your Home Town's Leading Business Man. Big commission. Selling Groceries, Coffee, Canned Goods, Paints, Motor Oils, Roofing, Tires, to consumers. Free Sample Case. Money advanced. Liberal Credit. No experience necessary. Loverin & Browne, F1615 So. State, Chicago.

SALESMEN—Become Independent. Own Your business, experience unnecessary selling our $7,500.00 Accidental Death; $50 Accident; $25 Sick Weekly Benefits—$12.50 Yearly. Other Amounts proportionate. Guaranteed steady income from renewals. $250,000 Deposited Insurance Department. Universal Policy, Dept. A, 30 Clinton St., Newark, N. J.

MILLIONS of business men waiting for Brand New indispensable $10.00 office utility saving hundreds of dollars annually. One man sold sixteen in three hours. Splendid profits. Write quick for trial offer and exclusive Virgin territory. Lightning Calculator Co., Dept. FT, Grand Rapids, Mich.

COLLECTS Money from the Dead-Beats. Retails $5.00—Cost $1.00—Profit $4.00. "New Method." Every Storekeeper, Doctor buys quickly. Wonderful Money Getter. Federal Association, Hartford, Conn.

75c PROFIT on $1.00 sale. Auto, furniture and glass cleaner. Your name on label. Exclusive rights; free sample. Mfg. E., 213 Griswold, Detroit, Mich.

SALESMEN earn One Hundred Dollars a week selling lowest priced, high-grade electric signs on easy terms. Commission to start; salary, expenses in thirty days. The McSavaney Company, Springfield, Ohio.

TOOL Salesman for complete line of automotive tools sold direct to mechanics and repair shops; exclusive territory; 30% commission. Automotive Tool Mfg. Co., Milwaukee, Wis.

DOUBLE Your Income. Read Opportunity, the Magazine that offers thousands of openings to double your income. Sent Free. Just send name and address. Opportunity Magazine, 750 N. Michigan, Dept. C-3, Chicago.

DON'T sell for others. Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1970W Broad, Richmond, Va.

$20 DAILY easily. New Patented Metal Specialty. Merchants buy on demonstration. You collect and retain your commission. We make deliveries and collections. Exclusive territory. Manager, 1059 Bell Telephone Bldg., St. Louis, Mo.

MR. BRUSH Salesmen—Old Established New York brush manufacturers require services of men in all territories to sell their extensive line of Sanitary Twisted in Wire Brushes. We pay larger commission than any other brush house in the country. Write immediately for our proposition. Wire Grip Sanitary Brush Corporation, 15 Mercer St., New York.

CAPABLE salesmen organizer. Good references. Ask about district manager proposition. Permanent, interesting work. Same territory. Your own business. Big annual income. Fairview Nurseries, Dept. MC, Geneva, N. Y.

SEND name, address on postcard. Free introductory copy Salesology Magazine; contains 1,000 money making opportunities. Offered by big reliable firms; no obligations. Salesology Magazine, Desk B-39, 500 No. Dearborn, Chicago.

SPECIALTY Salesman wanted. Big commissions being earned selling Ever-Ready cans. Write for particulars. Ever-Ready Can Company, Greenfield, Ohio.

TAKE orders for coffee, flour, dried fruits, canned goods, staple groceries, toilet articles, paints, radio sets, auto and tractor oils. No capital or bond required. We deliver and collect. Permanent business. Big pay. Write at once. Hitchcock-Hill Co., Dept. 59, Chicago.

MOTION—Color—Light plus changeable letter system make ours the last word in window salesmen. Actually boosts sales 200% to 400%. Every show window means an interested prospect. Get the facts and start pocketing $100 weekly. Display Products Company, A409 East 31st, Kansas City, Mo.

TOOL Salesmen—Mechanics—Distribute guaranteed line auto repair tools. Exclusive business of your own. Show 71 samples in case. Big commissions. Quality Tools Corporation, New Wilmington, Pa.

HELP WANTED

WANTED—Men—boys. Learn Auto Repairing $35.00 week. Sample lessons free. Franklin Institute, Dept. K-400, Rochester, N. Y.

WOULD you risk a 1c postal against the chance to make $5 to $15 daily during the next four months with an absolutely new line of Insured Hosiery, guaranteed 12 months? Your pay daily. Monthly bonus extra. Magnificent sample outfit furnished. If so, send name and address now to Macochee Textile Company, Road 2606, Cincinnati, Ohio.

YOU Are Wanted. Men-Women 18 up. Get U. S. Government Life Jobs. $95.00 to $250.00 Month. Steady work. Paid summer vacation. Full or experience unnecessary. Common education sufficient. We coach you without leaving home. 32 page book with full particulars free. Write immediately. Franklin Institute, Dept. K3, Rochester, N. Y.

DOUBLE Your Income. Read Opportunity, the Magazine that offers thousands of openings to double your income. Sent Free. Just send your name and address. Opportunity Magazine, 750 N. Michigan, Dept. C-1, Chicago.

MEN to train for locomotive firemen on railroads nearest their homes—everywhere; beginners $150-$250 monthly; promoted, locomotive engineer, $3,000-$4,000 yearly. Best paying positions on railroads. Railway Association, Desk M1, Brooklyn, N. Y.

DON'T sell for others. Employ agents yourself. Make your own products. Toilet Articles, Household Specialties, etc. 500% profit. We furnish everything and show you how. Valuable booklet free. Write at once. National Scientific Laboratories, 1970W Broad, Richmond, Va.

GOVERNMENT Jobs. Mail Carriers—Clerks, Railway Postal Clerks. $1700-$3000 year. Men 18 up. Steady. Sample coaching free. Write today sure. Franklin Institute, Dept. K16, Rochester, N. Y.

IMMENSE Profits Silvering Mirrors at Home. Plating autoparts, headlights, tableware, stoves, etc. Outfits furnished. Details free. Write Sprinkle, Plater, 287, Marion, Ind.

IF you can devote spare time to profitable work that pays $2.00 to $4.00 an hour, write us at once. No experience necessary. Nawco Company, Dept. 6-E, Covington, Ky.

MEN wanting to prepare for forest ranger job; $125-$200 month; nice cabin. Hunt, trap and patrol. Nat'l Forest list free. Write, Rayson, Dept. B-46, Denver, Colo.

IF you are a man worthy of the name and not afraid to work, I'll bet you $50.00 you can't work for us thirty days and earn less than $20.00. Think I'm bluffing? Then answer this ad and show me up. Openings for managers. Wonder Box sells on sight. The best selling proposition in America today. Write Tom Walker, Dept. 120, Pittsburgh, Pa.

POSTAL Clerks—Carriers. $1700-$3000 year. Men 18—up. 25 coached free. Write immediately. Franklin Institute, Dept. K16, Rochester, N. Y.

ARE You Old at Forty? See our advertisement on page 74 of this issue. The Electro Thermal Company, 2169 Main St., Steubenville, Ohio.

CASH paid for butterflies, insects. See Sinclair Display Advertisement on page 32.

MEN, Qualify for forest ranger job; $125-$200 month and home furnished; permanent; hunt, fish, trap. For details write Norton, 226 McMann Bldg., Denver, Colo.

U. S. GOVERNMENT wants men. $1,700-$1,900 and up at start. Railway Mail clerk examination coming. Let our expert (former Government examiner) prepare you for this and also Rural Carrier, Post Office, Customs, Internal Revenue, and other branches. Write today for free booklet. Dept. S, Patterson School, Rochester, N. Y.

GOVERNMENT positions pay $35 to $75 weekly. We help you get them. Big List Free. Write, Mr. Ozment, 101, St. Louis Mo.

EARN $10 daily silvering mirrors, plating and refinishing metalware, auto, chandeliers, bedsteads, headlights. Outfits furnished. E. Decie Laboratories, 1133 Broadway, New York.

BECOME a Landscape Architect. Uncrowded profession of wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Write for book. American Landscape School, 56-E, Newark, N. Y.

SILVERING Mirrors, French Plate. Easily learned; immense profits. Plans free. Wear Mirror Works, Excelsior Springs, Mo.

SEND name, address on postcard. Free introductory copy Salesology Magazine; contains 1,000 money-making opportunities. Offered by big reliable firms; no obligations. Salesology Magazine, Desk B-40, 500 No. Dearborn, Chicago.

GOOD Profits. Send 25c cartoon lesson $1.00. GPO, Box 471, New York.

INFORMATION

3 INTERESTING Magazines, 30c. "Judge Lindsay Debate." "Life Enigma." "Hell Fallacy." Exponent, Orlando, Fla.

SPEECHES. No matter where you must speak, here is help. 366 pages of instruction and anecdotes, toasts and complete speeches for the amateur or professional. Send no money. Simply write a postal for "Speeches, Their Preparation and Delivery." Pay postman postal charges and $1.25. Popular Mechanics Press, Room 906, 200 E. Ontario St., Chicago, Ill.

THIS is the season for making repairs about the home. Easily done with instructions in our new book. Tells exactly how to use tools, sharpen tools and cutlery, repair furniture and cabinets, upholster, work metal, solder, work glass, paint, stain, varnish, hang paper, repair plumbing, furnace, electrical equipment, shoes, harness, gloves and concrete work. Send no money. Just write and ask for "The Practical Book of Home Repairs." When postman hands you the book, pay him $2.50 and the postal charges. Popular Mechanics Press, Room 906, 200 E. Ontario St., Chicago, Ill.

MAILING LISTS

1,000 NAMES, $1.00. Mention Classification. Wineholt Sales Co., Woodbine, Penna.

LETTER SPECIALISTS

LETTER Specialists, national reputation! Powerful Messages $5.00! Practical! Resultful! Investigate! Finkel, 15 Fairview, Jersey City, N. J.

BUSINESS SERVICE

COLLECTION stimulators that collect accounts $3. Fred Beach & Co., Vincennes, Ind.

BROADWAY 200—Best address in New York. Two blocks from Wall Street. Beautifully furnished office. Woodwork snow white, green carpets, oak furniture. "Desk" or "Mail Privilege" exceedingly reasonable. We forward your mail daily. Room 404.

ACCOUNTS, Notes, claims collected everywhere. No charges unless collected. May's Collection Agency, Somerset, Ky.

PERSONAL Representation in Washington, D. C. Anything, Anytime. Service, Victor Bldg.

TYPEWRITERS AND SUPPLIES

UNDERWOOD Typewriters—only $3.00 down. Easy monthly payments. Low prices at less than manufacturers, 10 days' free trial. Rebuilt, all worn parts replaced. Just like a new machine. 5-year guarantee. Write for a big free catalog. A-151, Shipman-Ward Mfg. Co., 1515 Shipman Bldg., Chicago, Ill.

100 TYPEWRITERS Free. Overstocked. Rent Rebuilt Underwood or Remington $3.00 month. If you pay its value in rental, we give machine free. Particulars free. Pittsburgh Typewriter Exchange, 945 Hersch Bldg., Pittsburgh, Pa.

TYPEWRITERS, all standard makes. $10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

100 CARBONS $2.00; Typewriter Ribbons, guaranteed, 75c; two $1.25. PJH, 1927 N. Hoyne, Chicago.

TYPEWRITERS, all standard makes, thoroughly re-manufactured by the famous "Young Process" and shipped direct from factory to you on 10 days' trial. Guaranteed 5 years. Easy monthly payments. Write today for free catalog. Young Typewriter Company, Dept. 5746, 654 W. Randolph St., Chicago.

TYPEWRITERS, $5-$35.00; Motorcycles, $15.00-$75; Radios, $9.00-$65.00. Knight's, 1512 Locust, St. Louis, Mo.

PRINTING, ENGRAVING AND MULTIGRAPHING

NEARGRAVURE Process Printed Stationery—Exquisite Samples—See the Difference. Sollidays, Knox, Ind.

RESULTS-BRINGING printing—writing—artwork—complete advertising and printing service. Moderate cost. Tricraft House, Box 280, Harrisonburg, Va.

MULTIGRAPHING business correspondence, two dollars thousand. Hammermill letterheads, four dollars. Miscellaneous printing. Mayers Corporation, Monmouth, Ill.

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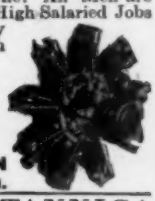

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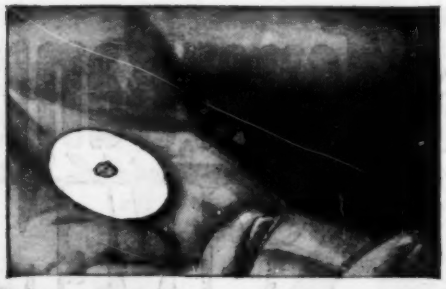

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then you have a right to suspect that
TOBACCO is getting the upper hand.

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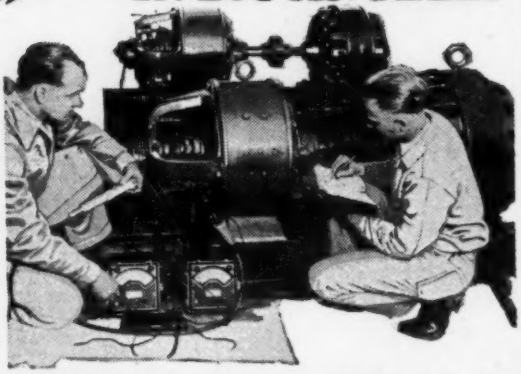

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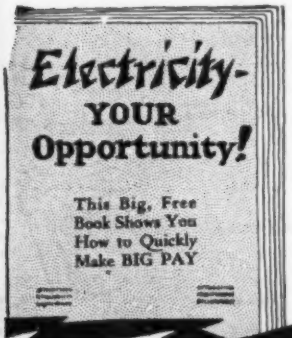

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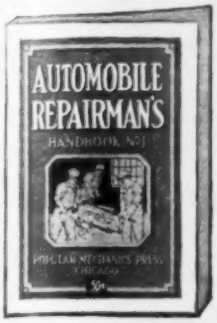

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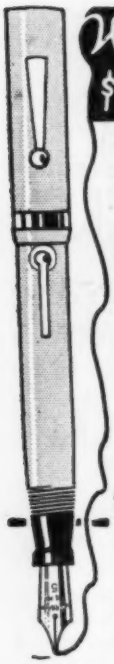

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Signed, L. G. Stransky,
Vice President.

Subscribed and sworn to before me this 29th day of November, 1926.

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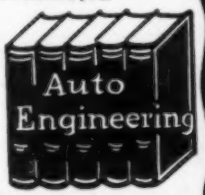

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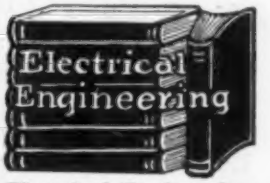

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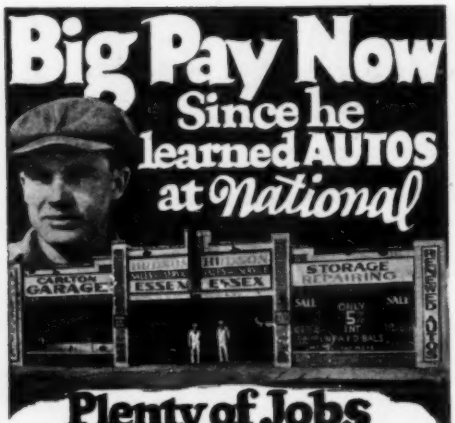

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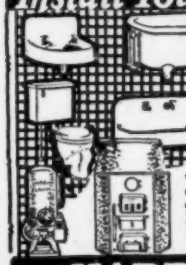

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State of Illinois, County of Cook, ss.
Before me, a notary public in and for the state and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, deposes and says that he is the editor and business manager of the Popular Mechanics Magazine and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit: First. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Popular Mechanics Co., 200 East Ontario St., Chicago, Ill. Editor, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Managing Editor, L. K. Weber, 200 East Ontario St., Chicago, Ill. Business Manager, H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill. Second. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) L. B. Windsor, 200 East Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 East Ontario St., Chicago, Ill.; Lina B. Windsor and Henry H. Windsor, Jr., Executors of the Estate of Henry H. Windsor, deceased, Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. H. H. WINDSOR, Jr., Editor and Business Manager. Sworn to and subscribed before me this 28th day of March, 1927. J. GRAHAM, Notary Public. (My commission expires June 17, 1928.)

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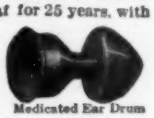

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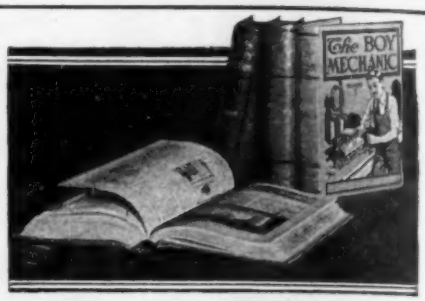

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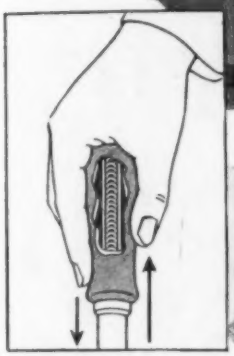

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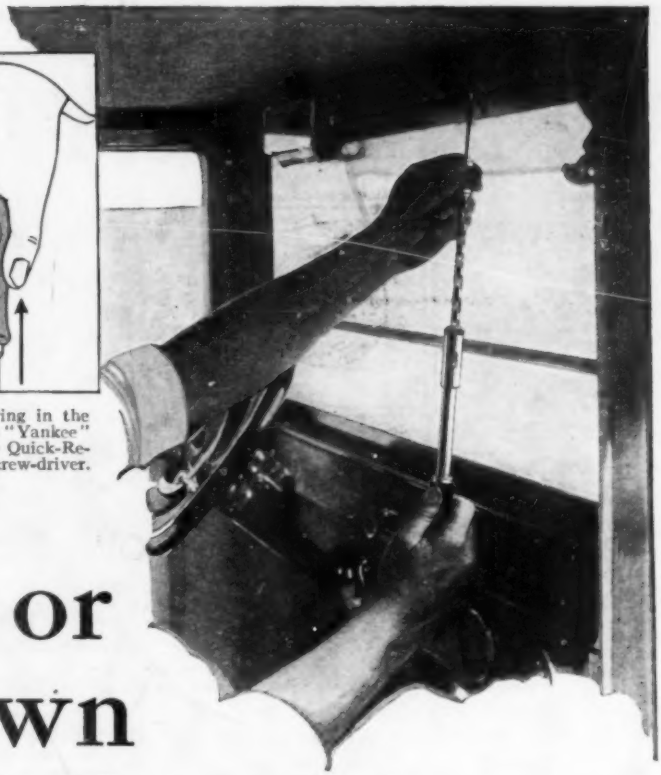

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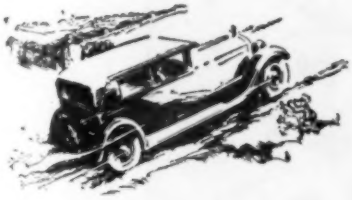

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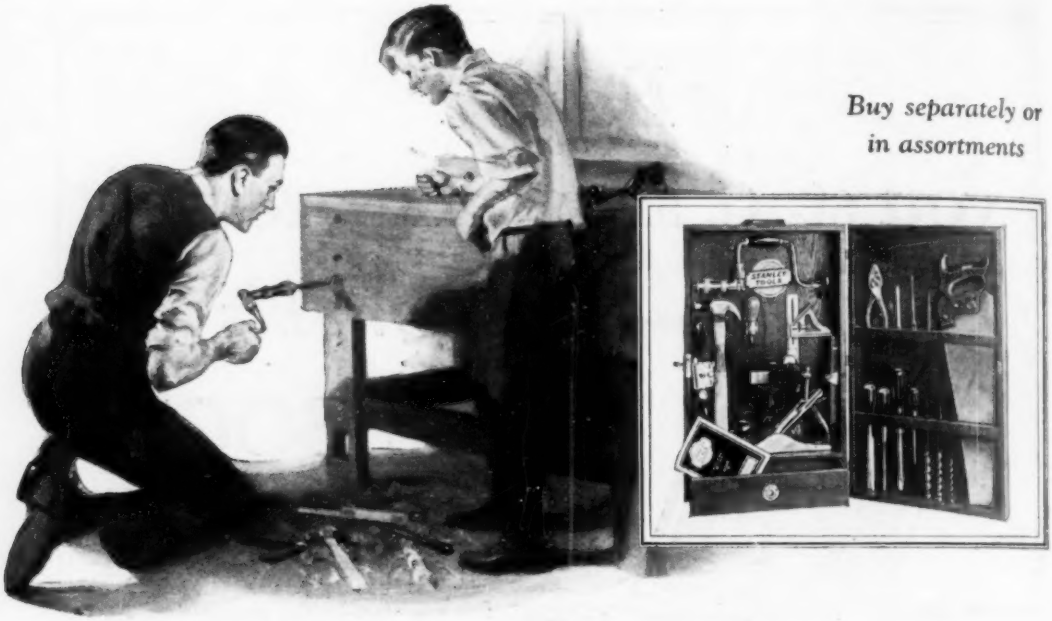

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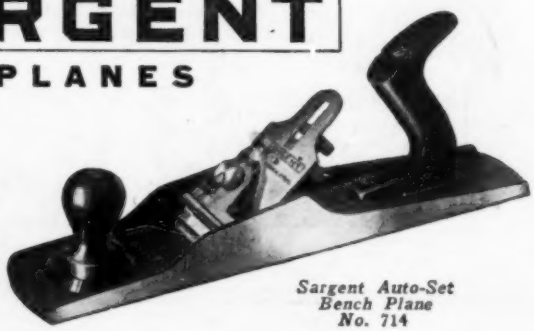

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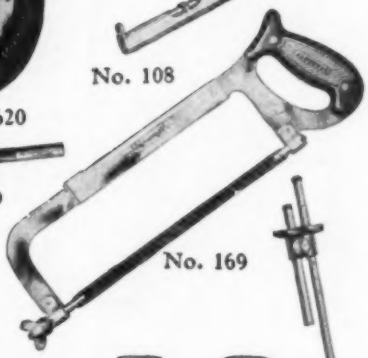

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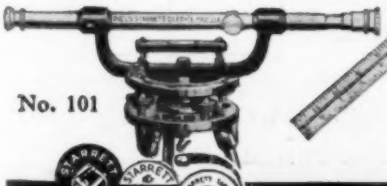

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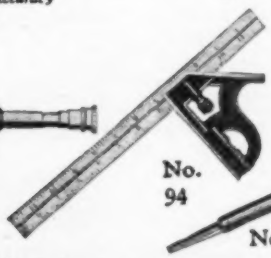

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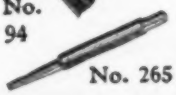

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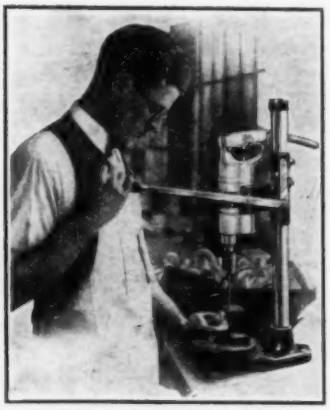

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Masterlite Mfg. Co., Desk RF-23, 110 E. 23rd Street, New York City

In Great Britain they say:

"England's wars are won or lost on the athletic fields of her schools"

The great war showed that if during your school years you wear light, well fitting shoes, you will have little foot trouble of the kind that caused thousands of young Americans to be rated physically defective

How TRUE this is was proven in America during the great war.

For in the West—land of husky outdoor men, apparently natural soldiers—as high as one out of four men was found imperfect for military service because of one mistake made in boyhood: heavy, ill-fitting shoes had injured and deformed the feet.

But in the South, where going barefoot or wearing light, easy-fitting shoes is more generally the custom, very few men had this trouble.

Keds give almost perfect barefoot freedom without barefoot dangers. In them you are ideally shod for games and sports on turf, cinder track or floor; and at the same time you are giving your feet the chance to develop which means continued athletic success and health.

KEDS—*the shoe of Champions*

Thirteen National Tennis Championships were won on Keds in 1926.

No other shoe has all the advantages of Keds. They are made only by the

United States Rubber Company

The "ROYAL TREAD"
An unusually rugged Keds model with tough moulded sole for indoor or outdoor wear. Great anti-slipping qualities. In white or brown

The "SPORTSTER"
A sturdy athletic-trim Keds model—built for hard wear. Comes in lace-to-toe style—white or brown—both models with gray soles

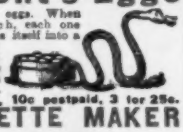
They are not **Keds**
Trademark Reg. U. S. Pat. Off.
unless the name *Keds is on the shoe*

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night

The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, **emits rays of white light,** rendering it **perfectly visible** in the dark. **THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Small bottle, **price 25c.** Larger size, **50c** and **$1** postpaid. **JOHNSON SMITH & CO. Dept. 810 RACINE, WIS.**

Serpent's Eggs



Box contains 12 eggs. When hit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner.

Price per box, 10c postpaid, 3 for 25c.

CIGARETTE MAKER

Roll your own and save money. Makes them better and quicker besides saving more than half. Use your favorite brand of tobacco. Neat, useful and handy. Pocket size, weighs ½ oz. Made entirely of metal, nickel-plated. **Price 25c postpaid.**

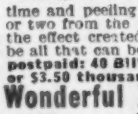
MIDGET BIBLE

GREAT CURIOSITY Smallest Bible in the World. Size of a postage stamp. **200 Pages.** Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE **15c** each, **3** for **40c**, **12** for **$1.35**, **100** for **$7.50.** Also obtainable in Leather Binding, with gold edges. **Price 50c each, 3 for $1.25, $4.50 per doz. Magnifying Glass** for use with Midget Bible, **15c.**

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 thousand postpaid.**

Wonderful X-Ray Tube



A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A mystery that no one has been able to satisfactorily explain. Price **10c, 3** for **25c; 1** dozen **75c. Johnson Smith & Co.**

Good Luck Ring

Quaint and Novel Design

A VERY striking and uncommon ring. Silver finish, skull and crossbone design, with two brilliant, flashing gems sparkling out of the eyes. Said by many to bring Good Luck to the wearer, hence its name, **Good Luck Ring.** Very unique ring that you will take a pride in wearing. **ONLY 25 CENTS.**

Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES, BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud **BANG!** A great mirth provoker yet entirely harmless. **Price 25c per box.**

Popular Watch Charms

15c

ONLY 3 for 40c; $1.35 doz.

Very pretty little curiosities and decidedly novel. Fitted with Magnifying Lenses that enlarge the picture to a very surprising degree; in fact, it seems almost incredible that a clear picture could be possible in such a small compass, and how sharp and distinct they show up when you look through. Come in assorted views—Actresses, views of Panama Canal, Lord's Prayer in type, etc.

Mystic Skeleton

A jointed figure of a skeleton 14 in. in height, will dance to music and perform various gyrations and movements while the operator may be some distance from it.

10c ppd.

Novelty Badges

Kissing Permit 10c *Garter Inspector 10c*

Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. **10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.**

MAGIC FLUTE

Wonderfully Sweet Toned and Musical

Post Paid 15c

The Magic Flute, or Humanatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is as charming as it is surprising.

Blank Cartridge Pistol

REVOLVER STYLE

PRICES 50c & $1.00 Post-Paid

Well made and effective Pistol modelled on the pattern of the latest type of Revolver; appearance alone is enough to scare a burglar. When loaded it may prove just as effective as a **real** revolver without danger to life. Takes standard .22 Calibre Blank Cartridges obtainable everywhere. Even the most timid person can use it with perfect safety. **A Great Protection Against Burglars, Tramps and Dogs.** You can have it lying about without the danger attached to other revolvers. **PRICE ONLY 50c**

Better make and superior quality for $1.00, Postpaid. Blank Cartridges .22 Calibre, (by express) **50c per 100.**

Revolver Holster and Strap (Cowboy type) for Blank Cartridge Pistol, **50 cents** extra.

BOYS! BOYS! BOYS!

THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it.

Never Fails. A 16 page course on ventriloquism, the Ventrillo, ALL FOR 10 CENTS

K.K.K

Everything about the **Ku Klux Klan** told in a clear, fearless manner. Book tells all—How it started and was oppressed in 1871—The New Ku Klux Klan—How Organized—How Members are Enrolled—Oath of the Klan—**Questions for Candidates**—Creed—Objects of the Order—Obedience—Fidelity—Pledge of Loyalty—**Ku Klux Klan and the Masons**—The Jews—The Masons—Real K. of C. Oath—The Negro Ku Klux Klan, etc., etc. Latest and most complete book on the Klan published. **Price 35c,** Postpaid.

Stamps or Coin

Female SEX Indicator 25c Male

Sex Indicator

Hold the **MAGIC INDICATOR** over a man's hand—instantly it moves in a straight line, backward and forward. Hold it over a woman's hand and it describes a complete and continuous circle. The same action can be obtained over a letter written by a man or woman, etc. It is fascinating; baffling. We have never been able to figure out how it's done, but we've never seen it fail. Many novel and entertaining feats may be performed with the Sex Indicator. For example, similar results can be obtained with animals, cats, dogs, rabbits, over birds, chickens, canaries, etc. Also used to predetermine the sex of chickens and birds, etc. In fact it is sold as a patented egg tester in Europe. **Price 25c, or 3 for 65c ppd.**

LOOK 35¢ Look

With Illustrated Directions

3 for $1.00

Wonderful instrument. Greatest thing yet. Nine separate articles in one. Everybody delighted with it. Odd, curious and interesting. Lots of pleasure as well as very useful. It is a double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a Pocket Mirror, and a Laryngascope—for examining eye, ear, nose and throat. It is worth all the cost to locate **a single painful cinder in the eye. Folds flat and fits the pocket.** Something great—you need one. Don't miss it. Sent by mail, postpaid.

Price only 35c or 3 for $1.00

JOHNSON SMITH & CO., Dept. 810, RACINE, WIS.

JOHNSON SMITH & CO.

Dept. 810 RACINE, WIS.

A De Luxe Edition of our new 1927 CATALOG mailed on receipt of 25c. Handsome binding. Bigger and better than ever. Only book of its kind in existence. 550 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unprocurable elsewhere. Remit by Stamps, Coin, Money Order, Check, etc. Unused U. S., Canadian and Foreign Stamps also accepted.

COMIC CELLULOID BUTTONS

These Comic Celluloid Buttons provide subjects for pleasant jokes and amusing conversation and thus smooth the way to a more familiar acquaintance and cordial friendship. There are seventy different titles altogether, all very wittily worded and quite unobjectionable. Wear one and see the effect. All **four** Buttons illustrated above will be sent postpaid to any address for **ONLY 20c** or a **dozen**, all different, for **45c.**

SURPRISE SOAP

You've heard of people turning green with envy but they haven't turned half as green as the fellow who unwittingly uses this soap. It is an exact duplicate of an ordinary piece of soap. Secret: it contains a chemical which acts like a dye as soon as it comes into contact with water. **PRICE 15c postp'd.**

KEYLESS LOCKS

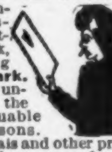
25c Postpaid

These clever locks cannot be opened unless you know the combination. No key necessary. For your locker, bicycle, tool chest, mail box, thousands of uses. Shackle and tumblers nickel plated. Weighs trifle over one ounce. Small, yet strong. Secret and full instructions with each lock. **PRICE 25c or 3 for 65c postpaid.**

Every Boy His Own Toy Maker

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Raft, a pair of Skis, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages, 150 illustrations. **PRICE, 10c postpaid; 3 for 25c postpaid.**

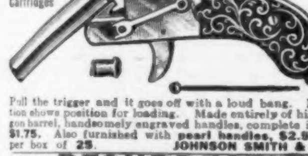
INVISIBLE INK



The most confidential messages can be written with this Ink, for the writing **Makes No Mark.** Cannot be seen unless you know the secret. Invaluable for many reasons. Keep your postals and other private memorandums away from prying eyes. Great fun for playing practical jokes. **Only 15c a Bottle; 3 for 40c.**

REAL PISTOL Miniature Watch Charm Pistol

Shoots Blank Cartridges



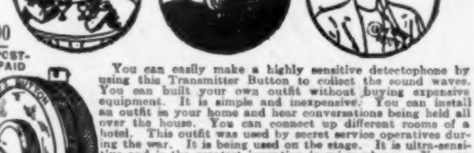
Exact reproduction of a real pistol: actually fires Real BLANK CARTRIDGES of miniature size. Illustration is actual size. 1¼ inches long, with ring at end for attaching to watch chain. Loads like a regular pistol.

Pull the trigger and it goes off with a loud bang. Pistol is break-open type; illustration shows position for loading. Made entirely of high grade steel, nickel plated, octagon barrel, handsomely engraved handles, complete in box with cleaning rod. **PRICE $1.75.** Also furnished with **pearl handles, $2.50. BLANK CARTRIDGES, 50c** per box of **25.** **JOHNSON SMITH & CO., Dept. 810, RACINE, WIS.**

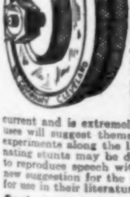
RESURRECTION PLANT

One of the most wonderful plants known. Possesses the strange power of turning in a few minutes from an apparently lifeless, dry herb to a **BEAUTIFUL LIVING FERNLIKE PLANT** of a dark green color. Simply place the plant in saucer of water, it will open up and start to grow in 20 minutes. When taken out it will dry up and go to sleep until placed in water again. Fine house plant—summer or winter. **10 cents each or 3 for 25c., 75c per doz., postpaid.**

Microphone Transmitter Button



$1.00 POST-PAID



You can easily make a highly sensitive detectophone by using this Transmitter Button to collect the sound waves. You can built your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, stiff calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk-up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. $5.00 is given to anyone who sends in a new suggestion for the use of the Button providing the manufacturers find it suitable for use in their literature. **PRICE $1.00 POSTPAID ANYWHERE.**

MAGICIAN'S OUTFIT

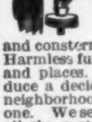
Apparatus and Directions for a Number of Mysterious Tricks Enough for an Entire Evening's Entertainment

☛ANYONE CAN DO THEM 75c

It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for seven firstrate tricks, including The Disappearing Rose, that, when placed on the lapel of your coat, vanishes from sight at will; the Magic Vase and Ball Trick (a Wooden Ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); The Magic Nail with which you can apparently cut your finger almost in two; the Wonderful Card Trick (a card is placed in an envelope, and when open an entirely different card altogether is found); The Disappearing Coin Box a coin is placed in the little wooden barrel, and, when opened again, is found to have vanished entirely, or can be made to change into a coin of another denomination); The Famous Dissolving Penny Trick; The Glass Goblet and Vanishing Coin Trick (a coin is dropped into a glass of water, and when the water is poured out the coin has vanished). With the tricks described above we send full printed instructions for performing each trick, so that anyone can readily perform all the tricks to the great amusement of their friends or the public. Any boy of ordinary intelligence, with this Cabinet of Tricks in his possession, can give a parlor entertainment not inferior to some regular magicians. Besides the tricks contained in the Cabinet, there are many other feats and illusions fully explained with full printed instructions, for which you easily make or procure the necessary apparatus. This unexcelled Cabinet of Tricks for **ONLY 75 CENTS POSTPAID TO ANY ADDRESS.**

Great Fire Eater

Most Sensational Trick of the Day!



With the Fire Eater in his possession any person can become a perfect salamander, apparently breathing fire and ejecting thousands of brilliant sparks from his mouth, to the horror and consternation of all beholders. Harmless fun for all times, seasons and places. If you wish to produce a decided sensation in your neighborhood don't fail to procure one. We send the Fire Eater with all the materials, in a handsome box, the cover of which is highly ornamented with illustrations in various colors. **Price** of all complete only **30 cents,** postpaid.

SQUIRT ROSE

25c

A REAL STARTLER. This is the most popular of all squirt tricks. The flower in your coat looks so fresh and sweet that everyone is tempted to inhale the delightful perfume. Then is the moment to press the bulb. Geewhillikens Don't they jump? There is a very long rubber tube that easily reaches to the pocket of your coat or trousers, and the bulb is large enough to make a dozen shots with one loading. **PRICE 25c** *each, or* **3** *for* **65c** *postpaid.*

PISTOL, OPERA & FIELD GLASS

PRICE POSTPAID, **$1.00**

It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up, as shown in the illustration at the right, revealing nine most useful articles—Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Sun Compass, etc. In the handle of the revolver there is a place for various pocket necessaries, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blued finish, that can be carried comfortably in pocket. **PRICE $1.00.**

SURPRISE MATCHES

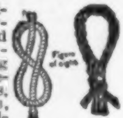
More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. **PRICE 10c per box, 3 boxes for 25c, or 12 for 75 cents.**

10c

SEEBACKROSCOPE

By merely placing this clever instrument to your eye, you can see what is going on behind your back, and sometimes you see very interesting things when no one thinks you are looking. Why it is just like having eyes at the back of your head. **PRICE ONLY 25 cents, postpaid, 3 for 50 cents.**

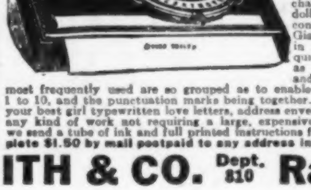
NEW BOOK ON ROPE SPLICING



A most practical handbook giving complete and simple directions for making all the most useful knots, hitches, rigging, splices, etc. Over 100 illustrations. All about wire rope attachments, lashing, blocks, tackles, etc. 37 Heraldic Knots illustrated. Of great value to mechanics, riggers, campers, boatmen. **Price 20 cents postpaid.**

The "Little Giant" Typewriter

A First Class Writing Machine For $1.50



A perfect little typewriter for $1.50. There are thousands of persons who would like to use a typewriter but whose needs and business do not warrant the expense attached to the purchase and use of a fifty or seventy-five dollar machine. To such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it, and write as rapidly as they would with pen and ink. The letters of the alphabet most frequently used are so grouped as to enable one to write rapidly, the numerals 1 to 10, and the punctuation marks being together. With this machine you can send your best girl typewritten love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a tube of ink and full printed instructions for using the machine. **Price complete $1.50 by mail postpaid to any address in the world.**

Send remittance (Postage Stamps accepted) for all articles listed on above and previous page to

JOHNSON SMITH & CO. Dept. 810 Racine, Wis.

4 out of 5 Have Razor Pains

But not the folks who shave with Barbasol. No, sir; all slick and swift and cool for them. No brush. No rub-in. Use Barbasol—3 times—according to directions. "Mister, you're next!"

Barbasol

For Modern Shaving

The Barbasol Company
Indianapolis, Ind.
I enclose 10c. Please send trial tube.

Name.....

Address.....

P-M-6-27

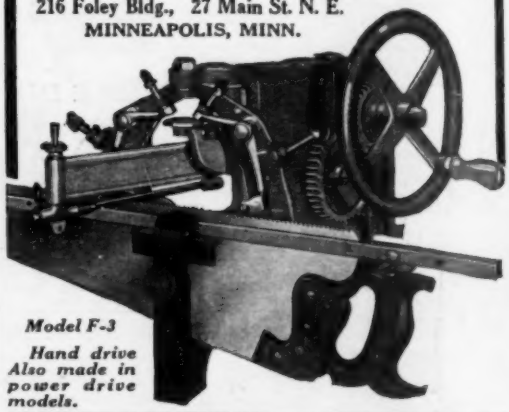
How Does He Do It?

—Always has extra money for pleasures and things he wants, yet he doesn't draw any more pay than you do. Hundreds are making from $3.00 to $6.00 an evening with the

FOLEY Automatic SAW FILER

The only machine that automatically files and joints *all* kinds of saws in one operation. Big demand for its speedy, perfect work. Often sets a man up in business for himself. You'll make extra money easily—write today.

FOLEY SAW TOOL CO., Inc.
216 Foley Bldg., 27 Main St. N. E.
MINNEAPOLIS, MINN.



Model F-3
Hand drive
Also made in power drive models.

MOTORCYCLES

Price $10 and up purchased through our Co-Operative Plan for as low as $1.00 down and $1.00 per week
Indians Harley-Davidsons Ace Henderson and Clevelands
Send ten cents for Bulletin A.
Motorcycles shipped all parts of the world
WALKER-INDIAN CO., 188 Mass. Ave., BOSTON

NEW VEST POCKET ADDING MACHINE

Guaranteed

ADDS, SUBTRACTS, MULTIPLIES, DIVIDES
Does work of $300 machine. Guaranteed 5 years. NOT A TOY.
Made of steel and indestructible. Million dollar capacity. Fits in pocket. Will not make mistakes. So simple child can operate it. Instructions furnished. Everybody should carry one for figuring.

FREE TRIAL **$2.50** Total Cost

SEND NO MONEY—Just name and address. We will ship Calculator immediately. On delivery pay postman $2.50 (Plus few cents Postage). (If outside U. S. send cash). If not satisfied after 10 day trial you get your money back. THOUSANDS OF SATISFIED USERS.
This is lowest priced practical calculator made. "Why pay more for inferior imitations?" Order from this ad.

Mail Coupon Today

BABY CALCULATOR SALES COMPANY
Dept. 41, P. O. Box 1118, CHICAGO, ILL., U. S. A.

☐ I am enclosing $2.50—send adding machine prepaid.
☐ Send Adding Machine C. O. D. $2.50 plus postage.

Name.....
Address.....
City..... State.....

AGENTS Write for big commission and territory proposition.

Your Coat and Vest Can Be Matched with New Trousers

⅔ of the price of your suit is in the coat and vest. Why not get full value out of them by replacing the worn out pants with a new pair.
Send us sample (small piece from seam or the vest) and we will show you how close we can match it. All tailored to measure. Prices range from $9.00 to $15.00 according to quality.

Enclose return postage if vest is sent.

ACME PANTS MATCHERS
Dept. BF 14, 20 W. Jackson, Chicago

I'll Pay You $40 A DAY!

No wind can blow it out!

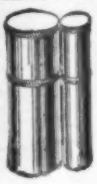
How does it work?

To Show My Mystery New Cigarette Lighter to Men

Quick, easy profit for you with this amazing invention. Lights cigarettes and cigars in strongest wind. Does work of expensive lighters but sells for only 50c. Guaranteed for 10 years.

Men Making Big Money

Elmers sold 48 in one day. Only one day's sales to dealers easily nets you $38. Enormous steady repeat business. No experience necessary. Work full or spare time. Smokers and dealers buy on sight. Send 50c and name for special sample and sure fire selling plans. Satisfaction guaranteed.



MASTERLITE MFG. CO., Desk CF-23
110 E. 23rd Street NEW YORK CITY

$3500

IN SIX MONTHS FROM $500!

washing houses with the

NIELCO Lightning Washer

(Patents Pending)

From an unretouched photo taken of the NIELCO LIGHTNING WASHER, in action and just before rinsing.

The only machine of its kind, to wash any painted surface, tile, terra cotta, and glazed brick.

Painters say that 90% of the houses painted each year are painted because they are dirty and NOT because they need paint.

We find that 44% of the home owners are interested in having this work done.

NIELCO Cleansing Compound used exclusively with the NIELCO LIGHTNING WASHER IS GUARANTEED to be harmless to the hands, paint or lawn.

Exclusive Territory

Available to men who want to get into a profitable business. Two men with one machine can make $20.00 per day profit, in addition to paying themselves regular wages. We help you get the business!

Write or wire for your territory and proposition

NIELSEN INDUSTRIES, Inc.

Maccabee Building

DETROIT MICHIGAN

Industrial Users: **A NIELCO LIGHTNING WASHER and cleansing compounds for every purpose**

LIVE DISTRIBUTORS WANTED!

Wood In A Can

Holds Screws and Nails without splitting!

PLASTIC WOOD handles like putty and hardens into real wood on exposure to air. It may be worked with tools, holds nails and takes paint, stain, lacquer and varnish like any wood.
PLASTIC WOOD is a great help in any construction or repair work. Try it to mend broken corners of screens and to fill old screw holes in window and door frames.
Sold by Hardware and Paint dealers—¼ lb., 35c; one pound, $1.00. Send coupon if they cannot supply you.

Addison-Leslie Company,
40 Bolivar Street, Canton, Mass.
Please send me a trial quantity of PLASTIC WOOD for which I enclose 35c.

Name.....

Address.....

Name and address of Hardware Dealer.....

.....

PARKS

WOODWORKING MACHINES

Cabinet Shop Special

$290

with Motor

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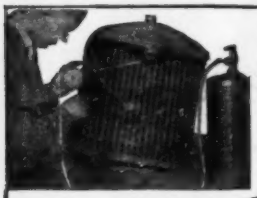

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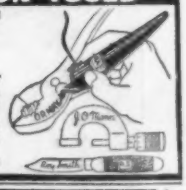

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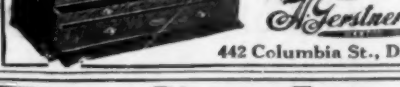

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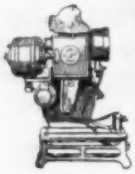

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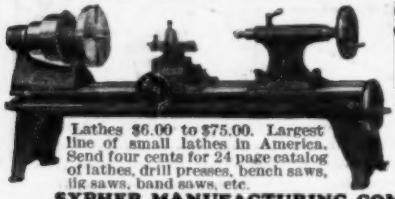

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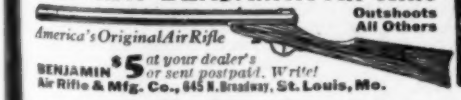

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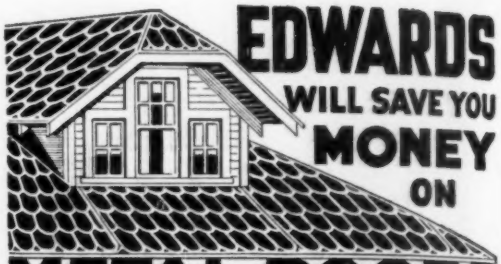

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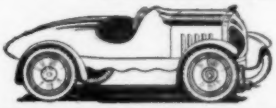

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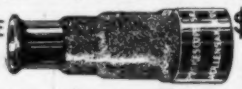

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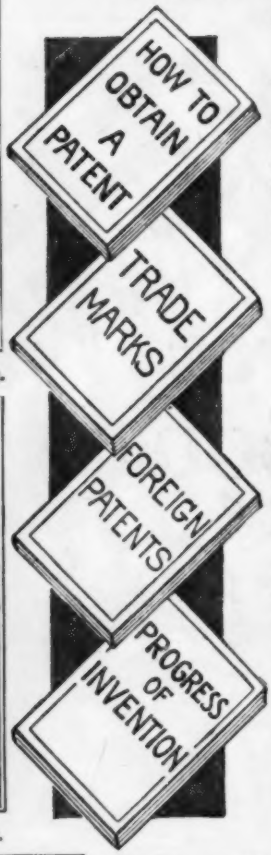

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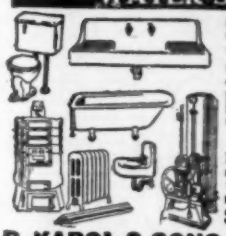

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30 DAYS FREE TRIAL
7 Tube-Single Dial RADIO SET

Write TODAY for This Wonderful Offer Direct from Factory! World's greatest radio. Perfect working, single dial control, 7-tube receiver, shipped to your home for **30 days' free trial.** Test it for distance, volume and tonal quality—and if you are not convinced that it is the best single dial set you ever heard, return it to factory.

Retail Price **$75** Completely Assembled

Metrodyne Super-Seven

Only one dial tunes in all stations. Get 1,000 to 3,000 miles on loud speaker. Easiest set to operate. Highest grade parts used. Magnificent Two-tone Walnut Cabinet.

Big Profits to Agents and Dealers

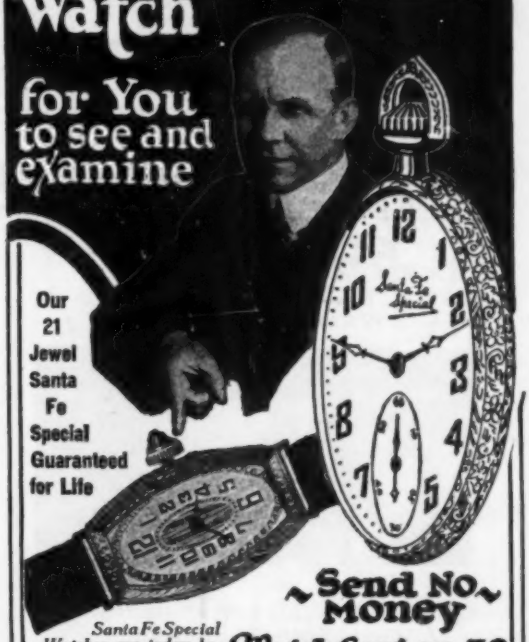
selling Metrodyne radios. All or part time. Great money making opportunity. Demonstrating set on **30 days' free trial. WRITE FOR OUR OFFER.**

METRO ELECTRIC CO.

2161 N. California Ave., Dept. 146 CHICAGO, ILLINOIS

I Want to Send You a Santa Fe Special-Watch

for You to see and examine



~Send No~ Money

Watch Sent on 30 Day Free Trial

Santa Fe Special Watches are today being shipped to every civilized country in the world, and are probably the best and most favorably known watch in both Army and Navy.

In addition to our NEW LOW PRICE, I will send for your approval one of these Standard Watches, guaranteed for a lifetime of satisfactory service, not only by the Santa Fe Watch Company, but by the Great Illinois Watch Factory. So accurate, Government officials carry them; so perfect and beautiful, jewelers say they are worth 1-3 to 1-2 more than we ask for them. I will send you one to see WITHOUT ONE PENNY DOWN—allow you to wear it 30 days FREE—then sell it to you on easy payments.

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You will never miss the few cents a day that will make you own one of these watches—SEND FOR WATCH BOOK—illustrating in beautiful colors hundreds of designs and combinations in cases in the POCKET WATCH, MEN'S STRAP WATCH and LADIES' WRIST WATCH. You can have your name or monogram and any emblem you may desire engraved in the Case to suit your own ideas. Write today for Free Watch Book, and make your selection at once, while this offer lasts.

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66 Thomas Building **Topeka, Kans.**

(Home of the Great Santa Fe Railway)

Mail coupon today!

SANTA FE WATCH COMPANY
66 Thomas Building, Topeka, Kansas

Please send prepaid and without obligation your Watch Book Free, explaining your "No Money Down" Offer on the Santa Fe Special Watch.

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BUILD and RACE THIS MODEL of the WORLD'S FAMOUS INTERNATIONAL STAR CLASS

Construction set consists of all wooden parts shaped, sails, keel, mast, deck, screws, glue, small plane, sandpaper and very complete instructions—28 inches over all.

Price of complete set.....$8.00 F. O. B. New York

Our complete catalog (worth 25c) will be sent free with every order for a Star Construction Set. Contains useful information to all model makers, also complete line of engines, boilers, fittings, power boats, sail boats and ship plans.

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WRIST WATCH $3.50

FOR MOTORING wear an Ingersoll Wrist Watch. The jolts and jars of driving don't affect its timing dependability the way they do the more delicate watches.

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Wrist Radiolite, tells time in the dark, $4.00. Dealers everywhere.

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Tires Hammered Full of Nails, *Leak no Air.* GALACITE a new Viscous Pneumatic Cement
(NOT A LIQUID)

Seals PUNCTURES Instantly —the very moment they occur. **One application** made in a minute without taking tire off wheel or rim does the work. Seals slow leaks and porous tubes. Galacite aids in preserving rubber often **doubling Tire Mileage.** *Don't confuse with anything else intended for the same purpose.* Galacite is new, different, clean and scientifically correct. Made by a long established, highly rated financially responsible concern.

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Hammer as many nails into a tire as you wish —**Pull them out. No air** will escape, **No pressure** will be lost. If you are not delighted we will pay you for your time and trouble.

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If you are interested in adding to your vulcanizing equipment—planning to add a repair department or start a shop —take the first step NOW. Get this new book! All the essential information with equipment illustrated and clearly described.

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Contains 5 Radio "Hook Ups" 500 Illustrations Over 1,000 Articles

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Turn 1 Dial-get programs everywhere: **30 Days FREE!**

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28 in. long

Users report Miraco Radios get Coast to Coast, Canada to Mexico, loud and clear on speaker; outperform $100 to $200 sets. Some hear Europe. Marvelous bargain! Don't buy unless 30 Days Trial proves it Most Selective, Clearest and Most Powerful Distance-Getter among big, fine 5-tube radios. Solid walnut cabinet. Write for

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Every set completely assembled, rigidly tested, fully guaranteed. Ultra-5, $49.75 list. Speakers, batteries, tubes, etc. at big savings.

Free literature, users' testimony and BIG SPECIAL OFFER

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Pioneer Builders of Sets
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USER-AGENTS WANTED Write for discounts

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SATISFACTION GUARANTEED

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I made $93 my first week

"Made $93 my first week. Since then I have been earning over $100 every week selling Stay-Prest—S. L. Patterson, Iowa.

MEN OR WOMEN

$123 Very First Week

"I worked six days six hours each day, and made $123 quick cash profit my very first week. Have been going strong ever since—Stay-Prest is the best seller ever."—J. W. VARNER, Iowa.

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R. E. Bendine, Kentucky, who had never had any selling experience, made $54 his first two days with this big profit maker.

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$39
Spare Time First Week

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Keeps pants always pressed. Puts in knife-edged creases, removes baggy knees, smooths out entire surface. Easy to use—takes only a few seconds. No steam nor heat. Saves nap of cloth. Lengthens life of clothes. Durably made of hardwood—lasts years. Finished in black leatherette. All metal parts heavily nickeled. Fits any size trousers. Folds to 15 inches to fit small hand bag. Over 500,000 in use.

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No waiting—no uncertainty! Average sale takes less than 7 minutes! Then you have your big, generous, quick, cash profit in your hand—we deliver and collect—you just write orders given you! Stay-Prest is absolutely guaranteed—patented in all countries—exclusive territories now being allotted—no time to lose.

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Stay-Prest never had competition—and in its new and improved form it cannot have. Everyone who takes orders for Stay-Prest makes big money from the very first day. Many earn $125 to $165 the first week, $500 or more the first month—$15 to $25 the first day. No experience necessary—just follow our tried, tested, and proven selling plan—we furnish everything—you risk nothing. Send now for FREE selling outfit offer.

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Send name and address and territory wanted. We'll show you how to commence at once to earn real money—$123 a week or more—and how to get the big Stay-Prest Super-Selling Equipment absolutely without cost. But you must act quickly—this offer will not be open long.

DON'T SEND A SINGLE PENNY

THE GETGEY-JUNG COMPANY
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THE GETGEY-JUNG COMPANY
G-121, G-J Building, Cincinnati, Ohio

Rush full information about Stay-Prest Trouser Presser and FREE Super-Selling Outfit Offer. Also consider my application for exclusive sale in my territory.

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City.....State.....

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New—we give 30 Days' Free Trial on newest 5-tube—ONE DIAL—Coast to Coast Radio. Buy direct from factory—save half and get 2 year guarantee. Full line table type, consoles or complete outfits at prices that will surprise you. Over 15,000 satisfied owners. Don't buy any Radio until you write us for FREE Catalog, low prices and 30 Day Trial offer.

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MONEY-BACK GUARANTEE

No more worry with "B" Batteries! Hook up a Perfect "B" Battery Eliminator and forget battery troubles forever. This wonderful new invention means better reception, sharper tuning. Gives you more real pleasure from your set.

Completely Equipped—No "Extras" to Buy

Operates perfectly on direct or alternating current, giving up to 90 volts current, and using the full wave of the power supply. Simple directions enclosed—anyone can plug it in to any kind of set up to six tubes. Constant voltage gives set more power. Costs no more than set of good "B" Batteries.

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Two-Tube, Loud Speaker Set	May 1925	25c
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Three-Tube, Low-Loss, Short-Wave Set	Oct. 1925	25c
Three-Tube, Loud Speaker, Loop Set	Dec. 1926	25c
Three-Tube, 15 to 550 Meter Set	Nov. 1926	25c
Four-Tube, Loop Set, for Car or Home	Aug. 1926	25c
Five-Tube, Browning-Drake Set	May 1926	25c
Six-Tube, Self-Contained Receiver	July 1925	25c
Six-Tube, Counterphase Receiver	Feb. 1926	25c
Six-Tube, Portable, Loop Set	June 1926	25c
Electrolytic B-Eliminator	Feb. 1927	25c
Eight-Tube, 1927 Model Superheterodyne; this set of blueprints includes drilling templates and extra photos	Oct. 1926	75c
B-Battery Eliminator	Mar. 1926	25c
Non-Radiating Unit	May 1926	25c
Simple Tube Tester and Chart	July 1926	25c
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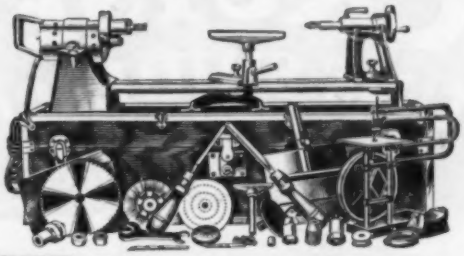
Address the RADIO DEPT.
Popular Mechanics Magazine
200 E. Ontario St., CHICAGO

Back numbers of the magazines describing the construction of the sets can be obtained from our Circulation Department, price 25 cents each.

THE NEW RED JACKET CRAFTSMAN'S LATHE



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It's fun to make furniture, garden trellis, toys, improvements and repairs with a set of tools, like this carefully designed by a master workman.

The complete equipment consists of the powerful Red Jacket Motor, with **direct drive to an accurate wood turning lathe** (capacity 9 in. x 34 in.); **a bench saw,** that has depth and side gauges; **scroll** and **jig saw;** and **all accessories for both portable and stationary power drilling, buffing, grinding and cleaning.** Attaches to any light socket and converts your work bench into a complete private tool and machine shop.

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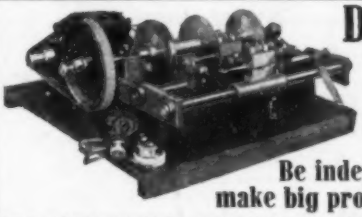

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Every Handy Man needs SMOOTH-ON NO. 1

SMOOTH-ON No. 1 hardens like iron and expands in doing so to make cracked, open or loose parts everlastingly tight.

With Smooth-On No. 1, you yourself can do a perfect job for a few **cents,** usually **in a few minutes,** and you can collect a handsome profit on every Smooth-On repair you make.

Get the Smooth-On habit and you will quickly find that it puts many dollars into your pocket. Try it on the following and see for yourself:

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Tightening loose screws, hooks, locks, door knobs, anchoring posts, bolts, hooks, etc., in brick or concrete, mending loose tool handles, stopping leaks in steam, water, gas, oil or stove pipes, mending cracks, breaks or leaks in furnaces and boilers, radiators, supply and flush tanks, sinks, pits, sealing open spaces where pipes go through walls, etc.

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Write for FREE BOOK

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5 Models to fit every auto, truck, tractor, bus, taxi, engine, etc., including **NEW** Ford with Holly Vaporizer. Not a toy. Retails $4.00 to $25.00, installed and guaranteed.

Gives added snap and pep. Faster pick-up. Higher top speed. More power on hills. Eliminates hard carbon deposit in engines.

The wonderful Vix Vapor Humidifier and Gas Saver is a Moisture device which makes autos run all the time with the same wonderful efficiency they do on a cool, moist night. Users report 43 to 75 miles per gallon—official tests show 30 to 43.2 miles. Vapor moisture does it! Automatically and permanently eliminates hard carbon deposit in engine; does away with frequent plug cleaning and valve grinding and gives added power, pep and pick-up. Five models for all autos, trucks, tractors, busses, taxis, engines, etc. Installation comparatively simple with pictured instructions—no adjustment or attention after attached.

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48 MILES Chas. J. Jabousek, Texas: (SWORN AFFIDAVIT) "The VIX on my Ford is great. Got 48 miles per gallon on 138-mile trip with 14 miles in black mud and chains on. Previously averaged 18 to 20 miles."

1 VIX FREE OFFER

The inventor is offering 1 free to introduce. Every Salesman, Agent and Car Owner should write for one at once. Direct Factory Agencies wanted everywhere. *Address*

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BIG, QUICK PROFITS for Salesmen, Agents, Dealers, who act quick for spare or full time, because this amazing new patent is a startling DEMONSTRATOR. Monthly earnings reported by "spare time" Agencies:

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The selection of S-M parts for the Popular Mechanics batteryless receiver, as well as for over half the season's popular circuits, are the best reasons why they will improve any set you have or intend to build.

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90,000,000 Tires in use. America's greatest opportunity for men with small capital. We furnish everything—$100 and up. **Easy payments.** We train you FREE right at home. Start making money at once. Write today for **Free Book "Steps to Success."**

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Full size, man's Professional model.

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Instruments complete with E-Z Player for as little as 50c a week. Or, E-Z Player sold separately.

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PLAY A TUNE IN 10 MINUTES OR SEND IT BACK

Thousands play this new easy way who do not know a note of music. You can know the popularity, new friends, money-making opportunities that come to one who plays.

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You will be surprised how little the cost to own your favorite string instrument. Send for Free Book explaining everything and the E-Z Pay Plan. No obligation. Be more popular, have more fun. Write today.

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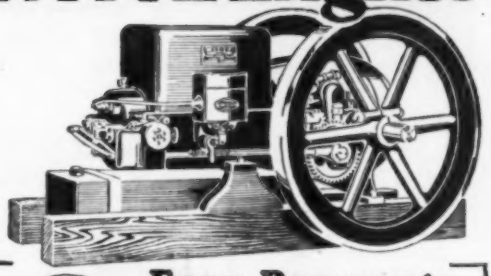
$5.00 Down buys a WITTE Engine



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With my Liberal EASY Terms the Witte Engine *pays for itself!* I sell direct—save YOU 25% to 50%! I am an engine specialist—been building engines for over 45 years. Mail coupon below now for my big FREE book telling WHY the great Witte Engine is the best you can buy—for any job—ANYWHERE.

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My unheard of Lifetime Guarantee is the talk of the engine world. Send for it today. The Witte engine is THE cheapest to operate. Burns any fuel with surplus power. Starts right off, even when it's 40 degrees below zero. Parts INTERCHANGEABLE. Spare parts years from now. We are today supplying parts for 40 year old Witte engines. 4 cycle throttling governor type. Semi-steel cylinders, heads, pistons and carburetor. Comes completely equipped with Wico Magneto. Buy on your own terms. No interest.

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At once—No more trifling with an uncertain wage job.

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Our national advertising is helping to develop it—building still greater business for American Universal Floor Surfacing Machine operators.

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Get your share of it.

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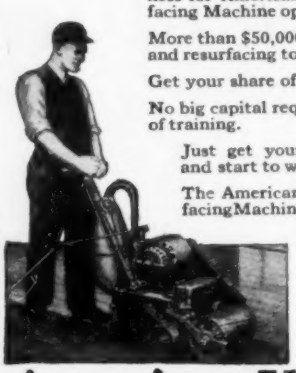
Just get your American Universal and start to work.

The American Universal Floor Surfacing Machine is electrically driven—Easy to handle—Does the work of six hand scrapers.

Work is pleasant — Always inside — And shows big profits.



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Price includes everything complete—lumber cut-to-fit, FREIGHT PAID to your station.

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We ship you any home you select, ready to erect, and ADVANCE YOU CASH to help you build. You pay us in small amounts monthly, just as you pay your rent—and your rent money is saved instead of spent. Send 25c in coin today for beautiful Color Book of Sterling Home Plans and you can be living in a home of your own a month from now.

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Lend wings to your eyes! People and objects miles away seem close. Wonder telescope brings new pleasures to home, farm, camp, travel, sport. Study the mysterious Sun spots; see Moon and Stars as never before. See people on the beach, on the mountains, etc.

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FREE Yes, absolutely free! A handsome leatherette Carrying Case and Shoulder Strap. Also Solar Eye Piece to view the sun—a special feature, found only on expensive instruments.

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5 Sections 8 Power Lenses

Brass bound; measures 12 in. closed; powerful achromatic lenses protected by dust caps.

Thousands Pleased

P. Brush wrote: "Watched submarines three miles off coast." Ed. Foster: "Tell time on clock five miles away." C. Scribner: "See lighthouse 18 miles away. Mrs. Yarbrough: "Could tell color of aeroplane four miles away." S. M. Gearhart: "Can see men working seven miles away." A. R. Walker: "Would not take $10 for it."

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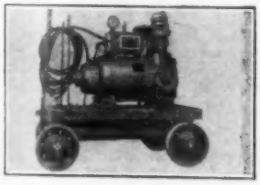

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Does the work of five men with brushes. Paints cars, furniture, houses, barns, garages. You can earn bigger profits yet charge far less than any competitor.

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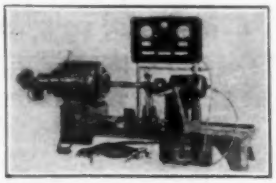

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Send me complete information on the items I've checked with your 30 day trial offer, easy payment terms, and information on how HB equipment will increase my earnings.

- ☐ One Day Battery Service Profits
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Name.....

Address.....

Liquid Bottle Cooler

8 Cold Tubes for 8 Different Flavors The Right Flavor always on Top—and COLD

Each tube holds 9 cold bottles—72 in all. 72 more in reserve rack so you can't run short. To serve any flavor asked for, take a warm bottle out of rack, push it in one end of tube, holding same flavor, and out comes a cold bottle on the other side.

"'Liquid' Cooler Doubled My Profits in Bottled Drinks"

—says A. CRUICKSHANK, Dallas, Tex.

Many make up to $675 a Month Serving Bottled Drinks this New Way

NOBODY ever dreamed that so much money could be made selling bottled drinks until the "Liquid" Bottle Cooler appeared two years ago.

Nobody ever imagined that bottled drinks could be served so fast, clean and cold.

Nobody ever conceived that the public would be so quick to pass up the old fashioned ice box or tub of ice water to buy from the new, sanitary, "Liquid" Bottle Cooler that they see advertised in Saturday Evening Post color pages.

But actual records tell their own amazing story. Read about them in the book "Liquid Profits"—sent free if you'll mail Coupon. Learn how more than 20,000 merchants in almost every line of business are ringing up unheard of profits with this new invention. Many who never sold bottled drinks before because of the muss and bother of old fashioned methods are now clearing $10 to $30 a day from a little waste floor space 3 feet square!

Draws Crowds of Good Spenders to—

Cigar Stores
Grocers
Roadside Stands
Theatres
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Candy Stores
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"Doubled Business and Profits"

A. Cruickshank of Dallas, Tex., writes, "My 'Liquid' Cooler has doubled my business and profits in drinks and quickly paid for itself." McGrain Motor Co. says, "Profits paid for 'Liquid' Cooler and left a nice margin." "Best investment I ever made. Doubled sales of soft drinks," reports F. J. Houser of N. Y. And a Schenectady dealer tells how two "Liquid" Coolers cleared $90.00 profits in a single day!

Profits Pay for "Liquid" Cooler

Many guess the price of "Liquid" Cooler at $200 to $500. Yet it costs only $100 on easy terms. One dealer paid entire purchase price out of first 5 days' profits. Others pay for it quickly out of savings in ice and clerk hire.

Send for Free Book

Get all the facts in new book, "Liquid Profits." Tells how others have increased sales of bottled drinks 100% to 400%—made up to $675 a month in season—cut ice bills 33⅓% to 66⅔%—saved 60% or more floor space and up to 80% clerk hire. "Liquid Profits" sent free if you give name of loca bottler. Mail coupon now.

FREE "Liquid Profits"

Liquid Carbonic Corp., Dept. P-6
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Send Free Book "Liquid Profits" and Easy Terms on The "Liquid" Bottle Cooler.

Name.....

Street.....

City..... *State*.....

My Bottler is.....

Blue Ribbon

5 TUBE NEODYNE

RADIO KIT-COMPLETE

Only $16.95

Can be built in 2 hours

FREE! GENUINE 20 INCH ERLA CONE LOUD SPEAKER & 5 TUBES

COAST to COAST RECEPTION

Latest 5 tube circuit designed by one of the foremost radio engineers in the country. Clear and realistic reception guaranteed. Solid bakelite panel and sub-panel. Panel beautifully engraved. Sub-base marked for all connections. 2 dial control; Kurz-Kasch bakelite indicator knobs. New type UX sockets. Low ratio transformers for improved tone quality. All hook-up wire and colored battery cable included. Tubes are 201-A type, tested and matched. Value $60, our price $16.95.

MAKE MONEY IN YOUR SPARE TIME!

Complete Set of Simple Plans and Directions to Build

Very easy to build this set with the plans and instruction we furnish. No complicated drawings. Can be built in 2 hours. Instructions for operation included. Make money by building these sets in your spare time and selling them to your friends.

SEND NO MONEY

Just write your name and address on a post card and ask us to send you this great kit together with the Erla Cone loud speaker and 5 tubes. We will ship them right away. When they arrive, pay only $16.95, plus a small delivery charge.

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SMOOTH WORKING AND FINE LOOKING

Frost-Radio Metal Frame and Bakelite Rheostats are the smoothest working rheostats made. Perfect contact with absolutely no wear on windings. You'll like them. Bakelite pointer knob; genuine Nichrome wire cannot burn out; supplied in resistances from 2½ to 75 ohms. Metal Frame, list, 50c. Bakelite, list, 75c. Secure them from your dealer.

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Send me literature about your rheostats as advertised in Popular Mechanics.

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Address _____

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Long-Eakins Co., 628 High St., Springfield, Ohio
Mail me at once your free catalog and full particulars about how to make big profits in the Crispette business.

Name _____

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Profit $1,000 Month Easily Possible!

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CAUTION! CLAROSTAT is being imitated. Don't be misled. Insist on seeing the name which is stamped on every genuine CLAROSTAT.

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Opens and Seals Jars in a Jiffy

SAVES FRUIT from spoiling! Saves hands from injury! Use when canning and every jar will be sealed SECURELY. Use in opening each jar and eliminate danger of cutting hands or breaking jar. Simple as A-B-C. Jar Lifter prevents burning hands in hot water. Six piece set. Fits pint, quart and half gallon standard jars. Needed year 'round. Sold direct by Tyler representatives or by mail, $1.00.

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Agents' Sample **65c** Sells for $1.25. Writes like a $7 Pen
Make $10 Daily Easily

LADIES' OR MEN'S STYLE
Comes in Red or Green
GUARANTEED 2 YEARS
Improved Point

MAKES $8.40 IN TEN MINUTES

I sold my dozen pens in about 10 minutes. Will order another dozen soon. TRACY KRENZ, Nebraska.

Write for FREE Wholesale Specialty Catalog.

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HOOKED! You bet he's hooked! Game little scrapper. He's given you a battle. Your heart pounds—your blood tingles—as you play him toward the net. Man! there's a *real* thrill.

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PORTABLE TYPEWRITER
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"Independent" GOLD POINT **$2**
Lever, Self-Filler Stylopen
"Makes Writing a Pleasure"
Jumbo, $3.50; Red, $3.00; Black
A. C. ULLRICH & CO., 161 Washington St., N. Y. *Est. 1884* **Agents Wanted**

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Select from **44 Styles**, colors and sizes. You can easily save $10 to $25 on your bicycle. Prices **$21.50** and up.

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Men! Women! Here's your chance to get your own shoes without cost, and to make the easiest money of your life. Take orders for genuine Tailor-Made Shoes from your friends and neighbors. Shoes Tailor-made to fit six actual foot measures. Choice of 70 different leathers—made in 70 styles in men's, women's and children's shoes. Unlimited market. Amazing value because sold direct from makers. Every pair guaranteed to fit perfectly and give comfort and satisfaction.

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Act at once. Mail Name and Address—Today.

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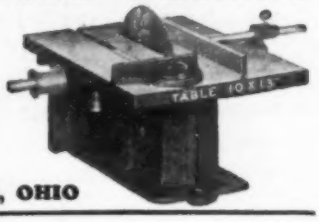

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Double the life of your coat and vest with perfectly matched pants. **100,000 patterns.** Every pair hand tailored to your measure; no "readymades." Our match sent **FREE** for your O. K. before pants are made. Fit guaranteed. **Send piece of cloth or vest today.**

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Wonderful new way of binding kodak pictures. Keep a photographic record. Sample Holland print from your negative for 10c.

FRANK SCOBIE, 43-8, SLEEPY EYE, MINN.

FOY'S BIG BOOK, in Colors

A complete guide to successful Poultry and Squab Raising. Low prices on CHICKS, Breeding Stock and PIGEONS.
Write Today! FREE!

FRANK FOY, Box 18, Clinton, Iowa

12,000,000 FORD OWNERS Need This NEW Timer!

Earn $100. Weekly Selling Them!

Automotive engineers claim that the average Ford may wear out from 8 to 10 ordinary Timers. Think of the sales possibilities when you offer the "Dynamo Timer" with a guarantee for the life of the car. You do not have to be a salesman. This amazing Timer sells itself on sight. You make 200 per cent profit on every sale.

Makes Old Fords Run Like New

Once a Ford is equipped with the "Dynamo" the timer can be forgotten—the only thing that will prevent forgetting it will be the noticeable improvement in the running of the car. More power, more mileage, instant starting, amazing pickup, are a few of the features that will make any Ford owner a "Dynamo" booster after he once uses this new Timer.

FREE SAMPLE

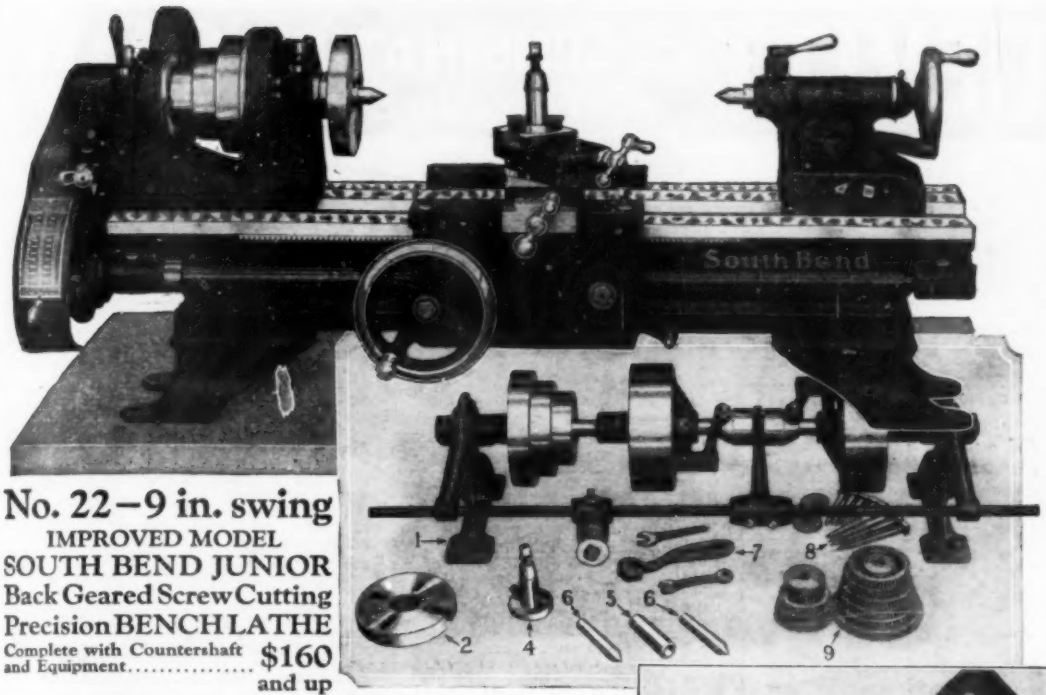
To aid our agents we have arranged a plan that provides them with a Free Sample so they can equip their own car or carry it for demonstration purposes. The unique principles of this wonderful Timer will make themselves apparent to any Ford owner after a minute's examination. Send name and address for Free Sample Offer and particulars of our big money making proposition.

Get Territory Quick

Our agents can easily make $5,000, $6,000, yes, even $10,000 a year. Spare-time workers make $20.00 and even $30.00 a day.

John Cable made $200 in less than 10 days. Many others report tremendous profits. You too can get into the big money class the same as John Cable and others.

DYNAMO TIMER CO.
426-1125 Eleventh St., Milwaukee, Wis.



No. 22—9 in. swing

IMPROVED MODEL SOUTH BEND JUNIOR Back Geared Screw Cutting Precision BENCH LATHE

Complete with Countershaft and Equipment..... $160 and up

A Precision Lathe for Small Work

An improved model precision screw cutting lathe used by repairmen, mechanics and small parts manufacturers. Will cut screw threads 4 to 40 per inch, bore, drill, ream, turn, chuck, turn tapers, etc. Hollow spindle for Draw-in Collet Chuck work.

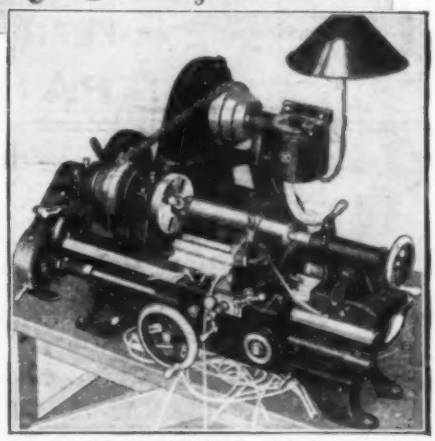
Can Be Fitted With Many Attachments

Milling and Keyway Cutting Attachment, Taper Attachment, Electric Grinder, Draw-in Collet Chuck, Electric Mica Undercutter, Turrets, Lathe and Drill Chucks, Tools, Etc.

Motor Drive from Ordinary Lamp Socket

Illustrated on the right is the Improved Model Self Contained Chain Drive Unit Motor Driven No. 22 Jr. Lathe complete with ¼-H. P. Reversing motor and Reversing Switch. Driven from an ordinary lamp socket.

BOOKLET No. 22—Illustrates, describes and prices the Improved Model No. 22 Jr. Lathe. Write for it today.



No. 22 Improved Model 9 in. x 3 ft. Lathe complete with Self Contained Unit Motor Drive with ¼-H. P. Single Phase Reversing Motor, Reversing Switch and Equipment - $261

South Bend Lathe Works

New York City Salesroom 183 Centre Street N. Y.--Tel. Canal 9085

622 East Madison Street
South Bend, Indiana

Features
Of the No. 22 Jr. Lathe

- Back Geared Head Stock
- Six Spindle Speeds
- Phosphor Bronze Bearings
- Power Feed to Carriage
- Set-over Tail Stock for Taper Turning
- Graduated Compound Rest
- Micrometer Graduated Collar on Cross Feed and Compound Rest Screws
- Built in 2½, 3, 3½, 4 and 4½ ft. bed lengths. Floor Legs if desired.

Time Payments if Desired.

Improved Model SOUTH BEND LATHE

The entire line of 96 types and sizes of South Bend Lathes has been completely redesigned in the last two years. The new lathes are heavier, stronger, and have greater belt power.

In 20 years, we have shipped 36,000 Lathes to 64 countries of the world. The most popular sizes listed below:

Size of Lathe	Quick Change	Standard Change
9 in. x 3 ft.	$258	$228
11 in. x 4 ft.	308	268
13 in. x 5 ft.	387	337
16 in. x 8 ft.	553	493
18 in. x 10 ft.	746	681

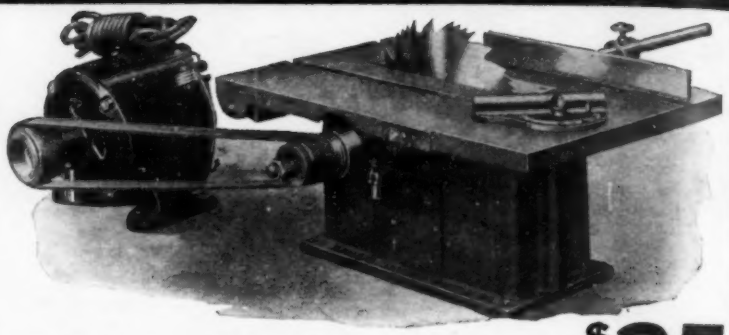
Specifications
Of the No. 22 Jr. Lathe

- Swing over Bed.....9¼ in.
- Length of Bed..... 3 ft.
- Distance between Centers.....18 in.
- Size of Centers.....No. 2 Morse Taper
- Hole Thru Spindle..... ¾ in.
- Size of Spindle Nose, 1½ in.. diameter 8 Threads
- Precision Lead Screw ¾ in. diameter 8 Threads per in.
- Thread Cutting Range..4 to 40 per in.
- Weight, Lathe and C'shaft....375 lbs.

Time Payments if Desired.

DEVITT 8" COMBINATION SAW
13 TOOLS IN ONE

Saw table raised, showing Emery wheel, saw guard and drill attachment.



Planer attachment on saw table.

Showing Sanding disc attached.

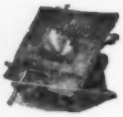


Table tilted for beveling.

Dado head attached for grooving.

YOU save a great deal of money, time and space by buying a Devitt 8" Combination Saw. Why buy special tools for beveling, grooving, buffing, etc.? The Devitt Combination Saw will rip, cross cut, bevel, miter, groove, mortise, tenon, drill, rabbet, grind, buff and polish. The attachments are easily and quickly adjusted. The saw and motor when set up ready for work occupy very little room. The ¼ H. P. 60 cycle 110 volt A. C. motor can be run from a light socket and provide power for other purposes when the saw is not in use. A cut up to 2¼" can be made with the 8" Combination Saw without planing. The ideal machine for shop, factory or home, complete with attachments: 12"x16" table, 8" Combination Saw, iron pulley for saw table, 10" ripping fence, adjustable cut off miter gauge, motor-specifications as above, 1¼" endless leather belt, wood pulley, 8 ft. cord and plug, 6" buffing wheel, ⅛" 3 jaw drill chuck, 5" emery wheel, 6" sander, saw guard, and 2" dado insert. $35.00 F. O. B. Phila. Height 7¾", shipping weight, 100 lbs.

$35 F. O. B. Phila.

(Planer attachment to fit on table top will smooth pieces up to 2 in. wide, $12.00 extra F. O. B. Phila.)

Write for our beautifully illustrated 4 page circular.

PAUL J. DEVITT 1102 South 2nd Street PHILADELPHIA, PA.

Men Women Wanted
Stunning RAINCOATS
AGENTS Special Price

Money Back GUARANTEE AMAZING VALUE ONLY **$3.95**

$75 A week paid to Agents daily. We deliver

This Wonderful opportunity is offered to the first person in each locality to introduce our exceptional line of stylish, fine tailored, good quality Super-Built Raincoats-A Real Value. **Get Your Coat FREE**

WRITE FOR FREE OFFER
SUPER-BUILT GARMENT CO.
Box 453, Dept 12, Chicago, Ill.

Start to Play Very First Day

Be the life of the party. Xylorimbists make *$5 to $25* a night. No knowledge of music required. Wonderful for home. Free, easy lessons; five days' trial; a year to pay. Write for big FREE Book.

J. C. DEAGAN, Inc.
A-145 Deagan Building
CHICAGO

I Offer You $8.00 a Day ~and a

Write quick for new proposition. We offer $8.00 a day and a new Chevrolet Coach, for demonstrating and taking orders for Comer All-Weather Topcoats and Raincoats. Spare time. No experience required. Sample Outfit Free. Write now.

COMER MFG. CO., Dept. W-5123, Dayton, Ohio

Stops Foot Pains In Five Minutes

An amazing new home method for permanently ending foot troubles with their aches and pains has recently been invented by Dr. F. H. Griffith, a successful foot and leg specialist. His method differs from others in that there are no arch supports, bandages, bands, cushions or other makeshift devices to be worn in the shoe or on the foot—no tiresome exercises, no discomfort or troubles. Yet foot and leg pains are stopped almost instantly, weak or fallen arches raised and strengthened, the circulation invigorated, weak feet made strong, sturdy and self supporting and foot troubles permanently ended. If your feet are weak or flat, if they ache and pain, burn and itch, are tired, tender, puffed and swollen, write Dr. F. H. Griffith, 3157 Davidson Bldg., Kansas City, Mo., for his free book "Foot Health," which fully explains his method. As it points the way to foot health and comfort, and is sent without cost or obligation, every foot sufferer should have it.

THE MELODY SHIP

Mayflower, 1620
The Pilgrim's Vessel

Size:
Height 25"
Width 9"
Length 27"

$12.50

Size:
Height 25"
Width 11"
Length 27"

Santa Maria, 1492
The Flagship of Columbus

Build a Ship Model Loudspeaker

Perfect Tone Plenty of Volume No Distortion

Do you want a loudspeaker that is different?
Do you want a beautiful Ship Model?
Do you want perfect tone?

Of course you do! All of these are to be found in the MELODY SHIP, and it will not cost you as much for both combined in one as the ordinary Ship Model or the ordinary loudspeaker alone would cost. The SHIP MODEL when complete is the most beautiful of its kind on the market today. The loudspeaker combination is unsurpassed for beauty of tone and undistorted volume that brings out all the low musical notes, faithfully reproducing the zoom of the bass viol, drums and tuba, as well as the soprano tones of violin and flute. There is nothing like it on the market anywhere today. It is absolutely new. This is not an experiment but a real proven device, sold on money-back guarantee to assure satisfaction.

THE WORLD'S LARGEST BUILDERS OF SHIP MODELS will supply you with all the parts to build a MELODY SHIP. You may choose either the Santa Maria or Mayflower Model. The parts for the Ship Models are made of wood. This is not a cheap cardboard imitation, but a real Ship Model. Putting it together is as simple as A B C. The instructions read like this: "Put No. 49 on top of No. 48, and tap lightly with a small hammer," etc. A school boy can put one together in a few hours.

The Loudspeaker Unit is of the Electro-Magnet type. Power amplification is not needed to force the low tones through. They come through with perfect ease and do not interfere with the higher notes, giving you faithful reproduction at all frequencies. The Unit is placed on the main mast, which is firmly seated two inches deep in the three-and-one-half-pound hull, making it impossible for counter-vibration to affect the perfect reproduction of the MELODY SAIL. The driving pin is attached to our specially prepared, super-vibrating MELODY SAIL. It does not change the appearance of the Ship Model. Instructions for installing come with each MELODY SHIP.

MINIATURE SHIP MODELS
3818-20-22-24 Baring St.
Philadelphia, Pennsylvania

If you own a Ship Model and wish to install the MELODY SAIL and Unit, forward us an outline drawing of your main-sail. We will then send you a MELODY SAIL and Unit to fit your Model, via Parcel Post, C.O.D., **$9.00** plus postage.

The unassembled parts for either the Santa Maria or Mayflower Model, without the Melody Sail attachment, can be had for **$4.98** plus postage. Full detailed diagram and instruction sheet showing and explaining every operation for completing the Model supplied with each.

If you want the unassembled parts for either the Santa Maria or Mayflower Ship Model, together with the MELODY SAIL attachment for making a MELODY SHIP complete, send us your order—NO MONEY—and pay postman **$12.50** plus postage.

CANADIAN AND FOREIGN ORDERS MUST BE ACCOMPANIED BY MONEY ORDER.

GUARANTEE: If, after assembling the MELODY SHIP, you do not think it worth many times the purchase price, return it to us in good condition and we will gladly refund your money. What can be fairer than this?

WRITE FOR CATALOG.

MINIATURE SHIP MODELS Dept. 112
3818-20-22-24 Baring Street
Philadelphia, Pennsylvania.

Please send me the complete parts, cut to fit and ready to put together, as follows, for which I agree to pay postman the indicated price plus postage:

MELODY SHIP .....Model, **$12.50**
SHIP MODEL only.....Model, **4.98**
MELODY SAIL for.....Model, **9.00**
(Be sure to indicate whether you want Santa Maria or Mayflower model)

PLEASE PRINT NAME AND ADDRESS PLAINLY TO AVOID DELAY

Name .....

Street or R. F. D.....

City or Town.....

State .....

The New No. 11

—a Brown & Sharpe Micrometer with several exclusive features

BS

No. 11 - $6.25
With Ratchet Stop $6.75

A feature of this micrometer is its adjustment for wear. It is so constructed that adjustments do not change the convenient reading position of the graduations on the hub.

The No. 11 has an exceptionally wide range of usefulness. It gets at places other micrometers cannot reach—its new frame design gives it a greater measuring capacity. The frame is of I-section for lightness with strength and rigidity. It has the popular black japanned finish.

Ask your dealer about Micrometer Caliper No. 11, or send for circular. For other Brown & Sharpe Tools, send for Catalog No. 30.

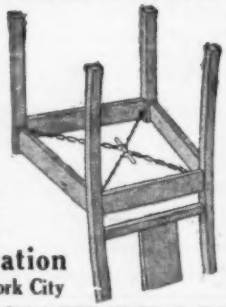
Dept. P M
BROWN & SHARPE MFG. CO.
Providence, R. I., U.S.A.

BROWN & SHARPE TOOLS

"World's Standard of Accuracy"

Wobbly Chairs?

LINX Fixes 'Em for GOOD—



Not a wire makeshift but a sturdy brace of coppered chain that pulls the chair together with a 1000 lb. pull!

Used by big Hotels. Try for 10 days FREE. Eighty cents if you like LINX.

H. S. Reid Corporation
16 Exchange Place New York City

CAL. 30-40

KRAG CARBINE STYLE

The Choice of those who know. 5 shot, 22 inch Barrel. A few used, but serviceable, for $9.75. Shipping weight, 13 lbs. Shipping extra. $15

Krag Rifles $12.50
Springfield 45 Shot Guns ... 4.75
KRAG Sporting Rifles $14.00
SPRGFLD. 45 Carbines 4.50

Krag Bayonets 40 cents each. Postage Extra—Shipping Weight 2½ lbs.
Terms Strictly Cash. No C. O. D. Shipments.
Catalogue Free on Request.

W. STOKES KIRK, 1627-P. M., North 10th St., Phila., Pa.

AGENTS

AMAZING NEW ADDING PENCIL

TOTAL SHOWS HERE

ADDS MULTIPLIES SUBTRACTS DIVIDES

Guaranteed Absolutely Accurate. Fountain pen size. Ends all mistakes. Send for yours **Today.**

AGENTS Great money maker. Everybody interested. Reserve territory **immediately.**

HOUK ADDING PENCIL CO., Dept. 38 St. Louis, Mo.

WRITE!

THIS COUPON is VALUABLE

NOW IS THE TIME TO GET YOUR TYPEWRITER!

Be up-to-date—know the pleasure and convenience of having one in your home. You'll be amazed at the uses everyone in your household will find for this real Underwood typewriter. Every member of the family will use and enjoy it! Don't send a cent—but do get our big special offer—our valuable book on typewriters and typewriting—FREE.

Any One Can Learn to Operate a Typewriter!

You can learn to write on this standard-keyboard machine in one day; it's so simple that even a child can use it. A week after the expressman has brought it, you'd feel LOST without it. A trial will PROVE it—and doesn't cost you a penny!

SPECIAL FREE TRIAL OFFER

We don't want a penny now. Nor any money at all unless this proves the typewriter bargain of your life. The trial is FREE. If you buy, our easy terms make it a pleasure to pay. There's no excuse now, for not owning a typewriter—and the finest make! We include all tools, a cover, etc., all complete, all ready to write. Write us now. Deal direct; we are the largest factory of the kind.

Our plan gives you the opportunity of a thorough trial before you buy. You run no risk whatever. You start to pay for your typewriter AFTER you have found it the only machine for you! But get the facts before this lot of machines is all in use. Clip the information coupon before you turn the page. It will pay you! Note the very useful book you will receive free! Write for full particulars at once.

The Greatest Typewriter Offer Ever Made

If you know typewriters, you know the perfect work and the ease and speed of a Shipman Ward rebuilt Underwood typewriter. New machines are guaranteed for only one year; WE GUARANTEE EVERY ONE OF OUR MACHINES FOR FIVE YEARS! If you have never owned a typewriter, start with the finest! You can try this one at our risk. But, the time to act is NOW. Don't miss out on this present bargain offer whereby you can get this genuine Underwood at a big savings. Don't do longer without the convenience of a typewriter.

FREE! Get our catalog free; lowest prices and terms. A manual free, too; valuable instruction for learning rapid typing, useful pointers for all who use a typewriter, business forms, social correspondence, work for others, etc. Clip coupon **NOW!**

Mail Today!

Shipman Ward Manufacturing Co.,
A-212 Shipman Building, Chicago, Ill.

Please send me your Free Trial Plan and Typewriter Book, together with your special offer on prices, terms, free course in Touch Typewriting and also how I can make money with this typewriter, without obligation. This is not an order.

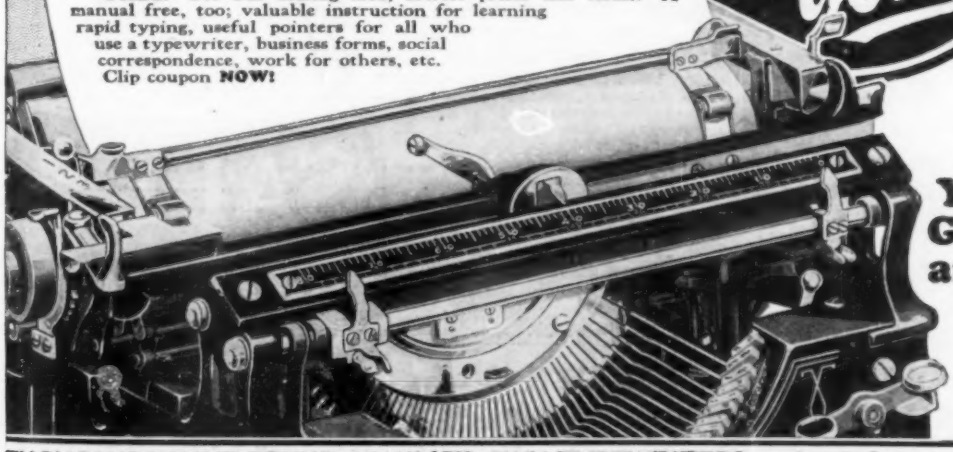
Name.....

Street or R F D.....

City.....

State.....

$3.00 DOWN and its yours



5 Year Guarantee

THOUSANDS HAVE FOUND A WAY TO OWN TYPEWRITERS—*and make Sparetime Cash too*

Amazing Sure-Fire Demonstration

sells by thousands new automatic attachment that sworn public tests prove makes Fords run

43.8 Miles on 1 Gallon of Gas

Agents everywhere report astounding results. R. K. Waite ordered 1000 Blancke devices in *one month*. (Profit $3000.00). Wires, "Get ready another 2000." Clyde B. Jones sold 63 devices in one day. (Profit $189.00). You don't need experience.

What Is This Sensational Demonstration?

The instant heat touches the Blancke Thermostatic Carburetor Control, the needle valve on the carburetor slowly turns before the fascinated eyes of spectators. As it cools the needle valve turns back again. It is easy to understand why immensely superior results can be obtained with this accurately adjusted automatic instrument—to see why Blancke Thermostatic Carburetor Control in official public and private tests showed 43.8 per gallon of gas. 250,000 tests averaged 32 miles per gallon. *Guaranteed to give over 30 miles per gallon on Fords.*

Starts Coldest Motor Instantly

even on wintriest days without use of choke. Guaranteed results combined with amazing demonstration make Blancke Control greatest agent's selling success of recent years.

Get One Free to Introduce

Also Blancke Plan that starts you without capital in a real business that pays you $300.00 to $2500.00 and up each month. Exclusive Territory. Sales guaranteed. Start to make big money—beginning NOW! Send coupon today for sample Blancke Control and great Distributor's Plan.

BLANCKE AUTO DEVICES CO.

157 E. Erie St. Dept. 805-H Chicago, Ill.

Mail This Important Coupon Today!

Blancke Auto Devices Co.,
Dept. 805-H, 157 E. Erie St.,
Chicago, Ill.

Gentlemen: I should like to get a Blancke Control Free to introduce in my community. Also send details of amazing new Guarantee Plan by which I can make from $300.00 to $2,500.00 a month profit.

Name.....

Address.....

City.....State.....

Strongest Guarantee In Automotive History

backs sale of Blancke Controls. Guaranteed to give over 30 miles per gallon on Fords — to practically eliminate carbon formation and its troublesome consequences —to save half oil—to relieve battery strain—make motor run smoother — give better acceleration—allow lower speeds in high gear. Starts motor immediately in any weather without use of choke and saves half repair bills. Ford owners everywhere are delighted with it and their boosting promotes sales.

SALES Guaranteed

$15.00 a Day Guaranteed to Distributors

Cadillac and Delco Light now use as standard equipment Thermostatic Carburetor Control under Blancke License. You can get no better proof of merit than this!

"Why-It's a Whole Machine Shop!"

This Amazing 17-Ounce Tool Conquers 60-Lb. Kit!

The most revolutionary hand tool ever invented. Does the work of other tools costing over $50—truly a tool of 1000 uses. Just the "hand-grip" of a tiny rubber band holds a hard bearing ball—the hardest-to-hold thing known—against a 300 Pound Pull!

Grips with 1 Ton Direct—128 Tons Per Sq. In. Pressures

through its 10-to-1 Leverage Power-Gear Transmission. In addition, the Grip LOCKS!

Among Thousands of Large Users are the MAKERS of Buick, Chevrolet, Nash, Packard, Reo, Studebaker, etc. Automobiles, Fisher Bodies, etc.; who with their employes have bought Kits in quantities of 500 to 1000! Studebaker has approved it for use in its Service Stations throughout the World. Thousands of housewives are using it too, because it does so many useful and amazing things so easily, so instantly. And even a woman's hand applies a HALF-TON Giant's Grip! Every Auto and Home Owner—every man who ever uses any tools needs it every day.

World Flight Equipment

It was standard equipment for the U. S. WORLD FLIGHT and the U. S. S. Shenandoah. Creates a sensation everywhere. Just its astounding 1-Ton Grip makes it worth ten times its cost.

The amazing EIFEL-FLASH PlieRench is a true Ratchet WRENCH—Parallel Pliers—Speed VISE, and more. Instantly and automatically it LOCKS its death-grip Jaws on the most worn and chewed nuts in the tightest places—and TURNS THEM!

AND—in the EIFEL-FLASH PlieRench KIT—weighing only 1¼ lbs.—you get a complete UNIVERSAL Tool Service that beats any number of other hand tools weighing 60 lbs. and costing $50.00.

AGENTS $200 a Week

PlieRench representatives earn amazing incomes demonstrating this wonderful new tool. One man alone sold nearly 10,000 in just one state. Fastest seller known. Factories buy by hundreds. Every auto and home owner buys. We have wonderful special proposition to agents. Mail coupon for full details. Why not earn $75 to $200 and more a week, spare or full time?

Whole Kit in 1 Tool

You get in a Royal Blue Leatherette HOLSTER, the 8½" Universal PlieRench with 2 EXTRA Jaws—a PIPE Jaw—and a WIRE Jaw—each giving undreamed of performance. Instantly (in 1/5 second) you insert the Jaw you need, and as quickly snap a One-Ton Grip on work of any possible kind, or shape, or size from 0-in. to 1½-in.! And—nothing Ever can get away from that grip!

HAVE YOU EVER HEARD OF A TOOL THAT WORKS LIKE THIS—it actually outgrips a 40-lb. Vise, and applies a 1-TON grip at the very jaw-tips. Will remove broken studs, taps, drills, etc., with next-to-nothing to hold on. Yet its smooth grip will hold a hair and coil a spring of hair-fine piano wire!

The Universal PlieRench

For every kind of Pliers, Nut Wrench, Vise, Clamp, and Spring-making Work—Everywhere.

The Pipe PlieRench

For every kind of Pipe Wrench and Pliers Work; Chewed Nuts that no other tools can budge, etc.

The Wire PlieRench

For every kind of Wire, Tire Chain, Cable and Spring Work; and the Special work other Tools won't do.

Guaranteed

The Plie-Rench KIT is positively guaranteed.

It has stood the most trying tests of time and service. Of thousands—the First Commander of the U. S. World Flight said—"It should form part of the equipment of each and every Airplane and Automobile." One Engineer said—"I have used my Plie-Rench for 5 years and wouldn't be without it for $100—and I mean it!"

Special Introductory PRICE ONLY $3.65

FREE

Every person using the coupon to order a PlieRench KIT will receive absolutely FREE our wonderful E-F ANGLE Screwdriver. It has 7 working edges 1, 8-in. to ¼-in. wide and is so strong it does the work of many screwdrivers—large and small. Handles auto lights and removes bottle caps. Fits keyring and keytainer. "The World's Greatest Small Tool"—yours FREE with the KIT

Regular Price $5.00

Thousands fortunate enough to be able to see the astonishing performance of this marvelous Plie-Rench KIT are glad to pay the regular price of $5.00. You can TRY this amazing performance on your own work in your own way for 2 weeks, and if the Plie-Rench KIT has not EARNED FOR YOU in that time the value of its price—just return it, and your money will be refunded as fast as the mails can carry it. Also, with your PlieRench KIT you receive a valuable Manual of Mechanics that every man should have. It tells in 64 pages and 145 illustrations some of the marvels of "The PlieRench Way"—the quicker, better, and easier way to do every kind of mechanical work.

Make use of the Coupon below, get this incomparably better tool KIT for the price of just one ordinary tool—let the marvelous Plie-Rench with its versatile 3 Jaws SPEAK FOR ITSELF as no Steel Jaws ever spoke before!

MAIL TODAY!

The Flash Sales Corp'n, FP-4809 N. Ashland Ave., Chicago, Ill.

☐ Rush your amazing new Eifel-Flash PlieRench KIT. I will pay postman $3.65 on arrival (Show with "X" item desired) Price $5.00. It is understood I may return Kit within 2 weeks and get My Money Back, if not delighted.

☐ 2. Send me user literature.

☐ 3. Am interested in F. Jeanne's Big Proposition.

Name.....

R. F. D. St.....

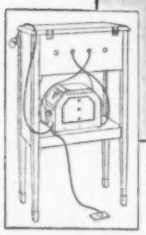
P. O. City.....

State.....

THE FLASH SALES CORP'N

FP-4809 N. Ashland Ave., CHICAGO, ILLINOIS

Snap a switch



The 6-tube Console pictured above stands 40 inches high—contains skillfully engineered shielded circuit—single drum dial control. Musicone built in. Price, without tubes and power unit, $95.

- No more batteries
- No battery charger to watch
- No batteries to water
- No failure of the power plant just as you sit down to a fine program
- No upsetting the house to have the radio serviced
- No apologies to make to callers that the batteries have just run down
- No batteries to recharge
- No batteries to renew

A B and C Power from the light socket for the latest model Crosley A C Radios

This power unit weighs 13 lbs., stands 9 inches high and is 4 inches wide and requires no more attention than a vacuum cleaner or an electric iron. It transforms mechanically ordinary 110-volt 60-cycle house current into smooth, quiet radio energy. **No interfering hum!**

Price $50

Crosley radios especially designed to use this battery eliminator are the 6-tube AC-7, a neat table model of the famous Crosley single drum control receiver selling at $70, and the 6-tube console model AC-7-C pictured above at $95.

Prices slightly higher west of the Rocky Mountains.

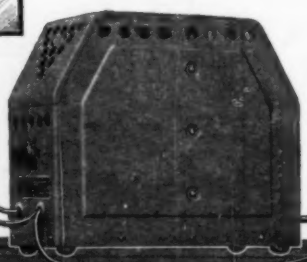
Crosley Musicones $9.75 and $14.75

Write Dept. 15 for descriptive literature

THE CROSLEY RADIO CORPORATION

Powel Crosley, Jr., President **CINCINNATI, OHIO**

Crosley sets are licensed under Armstrong U. S. Patent, No. 1,113,149, or under patent applications of Radio Frequency Laboratories, Inc., and other patents issued and pending



CROSLEY

BETTER COSTS LESS

RADIO

Radio Listeners!

Get Distance Loud and Clear

ALL SUMMER

SUBANTENNA

Works Like a Sieve

The Static is filtered out and held back by the lead outer jacket. Only the wanted broadcast goes thru to the copper core which connects to your set.

Filters Out So Much STATIC and Noise You Never Know they Exist

Imagine listening to beautiful music, thinking it is from a local station, then hearing the announcer clearly speak the call letters of a station a thousand miles away. Imagine the pleasure of getting real DX crystal clear on bad nights when STATIC is raging all around you. Imagine being able to bring in distant stations with tremendous volume on the same set which with an ordinary aerial gets only "air noises" and static crashes! Because the filtering action of SUBANTENNA delivers such a clean, clear signal to your set, you can turn the power full on when listening to DX. This means you can get bigger volume and more distance with your present set if you use a SUBANTENNA.

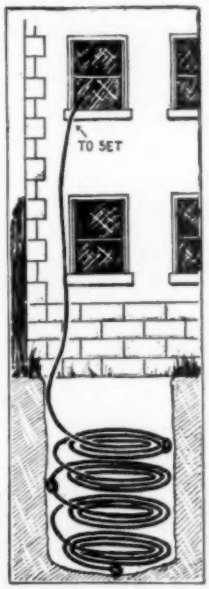
Read PROOF of the Amazing Performance of this Great, New Radio Improvement

"Subantenna you shipped me now working and results are good. Had WJZ, WLS, KDKA, WTAX, WSM and others during thunderstorm." Signed J. T. DONALDSON, M. D., Louisiana

"I have a six-tube set and after installing Subantenna I received greater distance than ever before. On January 18th, I received a program on my set broadcasted from Buenos Aires, South America, at 10:15 in the evening. I never could receive such distance on my outside antenna." Signed, W. C. FREYMUTH, River Forest, Ill.

"I am able to report that static which was a source of much annoyance here, has been **entirely eliminated** so far as I am able to observe. For clarity and for its contribution to selectivity I think the Subantenna is the best device I have ever had any experience with." Signed, REED L. PARKER, Chicago.

"I am glad to report to you the wonderful reception that I am receiving without interference or static of any kind. It is, indeed, a wonderful thing for radio and my opinion is that it will revolutionize the industry." Signed, EARL DESSAUER, Kansas.



Trial Offer!

Make this Convincing Test

Install SUBANTENNA. Leave your old aerial up. Select a bad night when DX is almost impossible with the ordinary aerial. Make a comparison station for station, connecting first your aerial, then SUBANTENNA. From stations that are just a mess of jumbled noise with the old aerial, you'll get reception that parallels local in sweetness and clarity. Send coupon at once for scientific explanation of SUBANTENNA and for particulars of GUARANTEE and FREE TRIAL OFFER. Send COUPON NOW:

CLIP AND MAIL AT ONCE!

Cloverleaf Mfg. Co., 2714-M Canal St., Chicago

Tell me all about SUBANTENNA and your FREE TRIAL OFFER.

Name.....

Address.....

Cloverleaf Mfg. Co.
2714-M Canal St., Chicago, Ill.

Just natural —

Just the natural taste of fine tobaccos put together right - there's nothing can beat that

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